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ELECTRICAL WORLD

McGraw-Hill Publishing Company, Inc.
NOVEMBER 14, 1931
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THE President's Organization on Unemployment Relief, under the able direction of Walter S. Gifford, provides the machinery for the intelligent relief of the needy in the hard winter that now faces them.

Money is the power needed to run this machinery and the I-T-E Circuit Breaker Company will do its share in this manner.

Two per cent (2%) of the gross sales of this Company for November, December, January, February and March will be donated to the relief organizations of the communities in which those sales originate. No order for less than fifty dollars will be included in this plan.

We have deposited with the Fidelity-Philadelphia Trust Company a special fund of $25,000 from which within ten days after the receipt of each order a check will be on its way to help the relief work.

Our voluntary donations to relief organizations all over the country will be in addition to our donations for local relief.

It is naturally our hope that other members of the electrical industry, as well as other industries, may be led to adopt this plan or a modification of it for supplying the money needed to ameliorate the condition of the nation's unemployed.

Our shoulder is to the wheel—many more shoulders are needed.

A. Edward Newton Jr.

A. EDWARD NEWTON, *Chairman*
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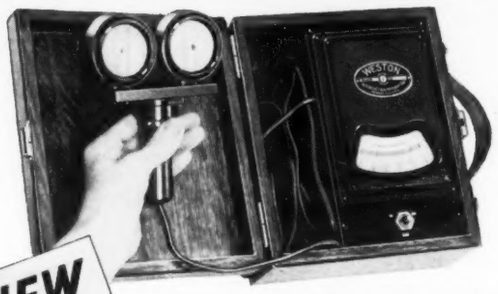

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A consolidation of Electrical World, Electrical Engineer and American Electrician

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NOVEMBER 14, 1931

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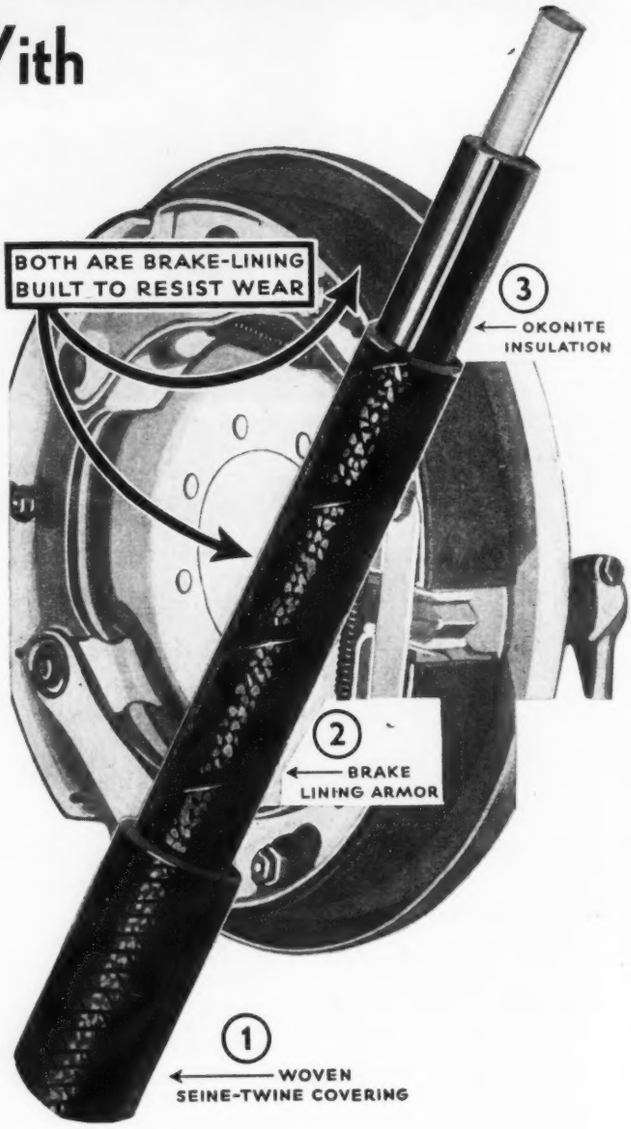

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OKONITE QUALITY CANNOT BE WRITTEN INTO A SPECIFICATION

ELECTRICAL WORLD

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for the Week Ending

November 14, 1931

Utility men debate with industry foes

—**Elements of the power issue** offer main topic at American Academy of Political and Social Science meeting. Speakers include Sloan, Ferguson, Gruhl, Bonbright, Pinchot, Donovan and Hodge—*p. 850.*

—**New York tie-line agreement** reached by utility and state representatives. Public Service Commission gives approval, and construction of important 110-kv. transmission link section remaining unfinished may start—*p. 850.*

To regard present conditions as permanent and then to legislate as if they were is a serious mistake. I grant that this so-called regulation would stabilize something—it would stabilize pretty nearly every wrong condition that we want to be rid of.

HENRY FORD

Merchandising laws benefit none

—**Co-operation rather than laws** will solve the misunderstandings which arise in utility merchandising, says Marshall Sampsell. In any event not fewer but more outlets for electrical appliances is the need—*p. 870.*

—**220-kv. line design varies** throughout lengths as local conditions impose limitations peculiar to certain sections. Aluminum and copper conductors used. Insulator assemblies another variable, as are transposition features—*p. 872.*

—**What does the public want?** As president of the New Hampshire League of Women Voters, Mrs. Glenn L. Wheeler offers some pointed comments indicative of the reactions of women's organizations to utility problems—*p. 886.*

Arkwright backs convention displays

—**"Don't give up the exhibit"** is the exhortation of P. S. Arkwright, who warmly defends the educational value of this familiar N.E.L.A. convention concomitant as a virtual necessity—*p. 875.*

—**Diesels as peak-load units** discussed pro and con at Kansas City meeting of A.S.M.E. Size of commercial engines is increasing, while output costs per kilowatt-hour show decrease—*p. 867.*

—**Builders of St. Lawrence plant** find alluvial deposits on rock ledge yield readily to large-scale shovel excavations and dredging. Long-disputed Canadian development nears operating status—*p. 860.*

Construction simplified at Beauharnois

Widely Divergent Viewpoints on Utilities Expressed at Philadelphia

"POWER and the Public" afforded a topic for discussion last week at the Philadelphia meeting of the American Academy of Political and Social Science in which the most widely divergent views were expressed. Some of the speakers were bitter in their attacks on the opposite point of view; some were loose in their deductions; others showed an attempt to be fair. Because each paper was prepared independently, without knowledge of the others, however, the discussion lacked some of those characteristics of a debate which aid the listener in reaching a decision on the merits of the questions attacked.

The topics which drew forth these diverse viewpoints were the field and function of the holding company, rates, regulation, valuation, public or private ownership, and the electrical future of the nation. Nineteen speakers expressed their views, only six of whom were identified with utility companies.

Speaking on holding companies, Prof. J. C. Bonbright of Columbia University urged their regulation rather than their destruction, suggesting revision of laws, publicity concerning their accounts, abolition of unregulated intercompany transactions and possibly regulation of security issues. John T. Flynn, New York, accepted the holding company that directly ties together operating companies, but caustically criticised the pyramided structures, advocating a joint commission to rectify the evils which, he asserted, have arisen. W. H. Hodge, vice-president Byllesby Engineering & Management Corporation, indicated the futility of cataloging defects and virtues and made a plea for a spirit of conciliation in place of present antagonism.

Pro and Con on Rates

The subject of rates drew forth considerable criticism from Harold Evans, formerly a member of the Pennsylvania Public Service Commission, and Leland Olds, attached to the Power Authority of New York, the former attacking the differences in domestic rates for similar quantities of energy, the differential between residential and industrial rates, and the domestic customer's burden from the tax component of rates. Mr. Olds declared that by reducing rates to 2 cents per kilowatt-hour domestic customers would use greatly increased amounts of energy and the utilities would profit thereby. Edwin Gruhl, vice-president and general manager North American Company, presented a 31-page paper answering critics of the utility industry and gave 47 references in support of his statements. Among the topics he discussed were cost and value of service, influence of demand, density and diversity, cost analyses, rate differentials and ratio of distribution costs to production costs. W. S. Lee, president W. S. Lee Engineering Corporation, dwelt on similar topics, but not so extensively, and cited examples to prove that the spread between wholesale and retail prices is greater in other industries.

At the session on federal versus state regulation Governor Gifford Pinchot of Pennsylvania made a characteristic attack on utilities, saying that he would not relax in his crusade against them because of other social problems. His major offensive was against holding companies, and he declared his conviction that they cannot be regulated by state regulation or state compacts, but only by federal control. Colonel W. J. Donovan, former United States Assistant Attorney-General, opposed this view, urging that regulation be left to the states or to state compacts. He said the latter had been very effective in the Boulder Dam and other controversies. Holding companies, he contended, can be controlled through the operating companies.

Valuation as a help in regulating utilities was considered of minor importance by W. L. Ransom, chairman of the public utility law section, American Bar Association, and by H. C. Attwill, chairman Massachusetts Department of Public Utilities. Judge Ransom contended that it is more important to have adequately staffed commissions with liberal appropriations. Mr. Attwill favored keeping security issues close to actual capital expenditures and basing rates thereon.

Government ownership and operation of utilities was favored by J. B. Eastman, Interstate Commerce Commission, to avoid divided responsibility and eliminate objections that have arisen. He proposed a plan of operation which would involve contracting for private operation. Samuel Ferguson, president Hartford Electric Light Company, considered the major arguments raised in favor of government ownership. He showed that in one company even a 12 per cent dividend on common stock amounted to only 0.4 cent per kilowatt-hour over what the capital charge would be if the property were government-owned.

The electrical future as well as economic development and social well-being are dependent on whatever affects utilities for good or evil, declared M. S. Sloan, president New York Edison Company. He painted a rosy picture of opportunities for increased usage in the home, on farms, in commercial buildings, on highways and for transportation purposes. But, to reach the stages of development he outlined, he admitted that changes in corporate structures and relations with government agencies will be involved.

D. R. Richberg, general counsel National Conference on Valuation of Railroads, declared that the future of electric power is bound up with future relations of man power and money power, but devoted most of his discussion to an attack on the unequal distribution of wealth, the mechanization of industry, "bland disregard" for the maintenance of buying power, the "maze" of holding companies and security-issuing practices.

▼

MARCONI IMPULSE AT ROME ROLLS DOWN TO RIO

—*Wide World Photos*

Guglielmo Marconi pressed a button at Rome a week or two since and instantaneously electric light flooded the colossal statue of Christ recently erected at Rio de Janeiro, Brazil.

▼

More Testimony Given on Louisville Byllesby Group

NOTHING EXTRAORDINARY developed in the renewed testimony of Andrew W. Wilcox, Federal Trade Commission examiner, on Monday and Tuesday of this week, when the financing and operation of the Louisville group of Stand-

ard Gas & Electric companies were again the subject of inquiry by the commission. Mr. Wilcox gave many details concerning the Ivyton Oil & Gas Company, the Madison (Ind.) Light & Power Company and other members of this group and their relationship to the top holding company, the Louisville Gas & Electric Company of Delaware. Profits on some subsidiaries were shown to offset losses on others, and the net income of the Delaware corporation rose from $693,828 in 1919 to $1,856,280 in 1928. Net earnings on investment by this company and its subsidiaries before deduction of federal income taxes averaged 6.8 per cent for the period 1917-1927, inclusive, Mr. Wilcox said. Earnings on the common-stock equity averaged 7.53 for the same period.

The next hearing was set for November 16, when the Byllesby Engineering & Management Corporation will be discussed.

▼

Albany-New York Line Approved; Early Completion

AUTHORIZATION TO THE New York Power & Light Company to go ahead with its 128-mile tie line between Greenbush, near Albany, and the Dunwoodie station of the New York Edison system at Yonkers was extended, after long delay, by the New York Public Service Commission on Tuesday of this week. The plans for this line were recounted fully in the ELECTRICAL WORLD for July 18 (page 100). There will eventually be four 110-kv. circuits from Albany down to Poughkeepsie, where a very large substation is to be built at Pleasant Valley, and two 132-kv. circuits thence south to Yonkers, where connection will be made with the metropolitan system, thus permitting exchange of power both ways.

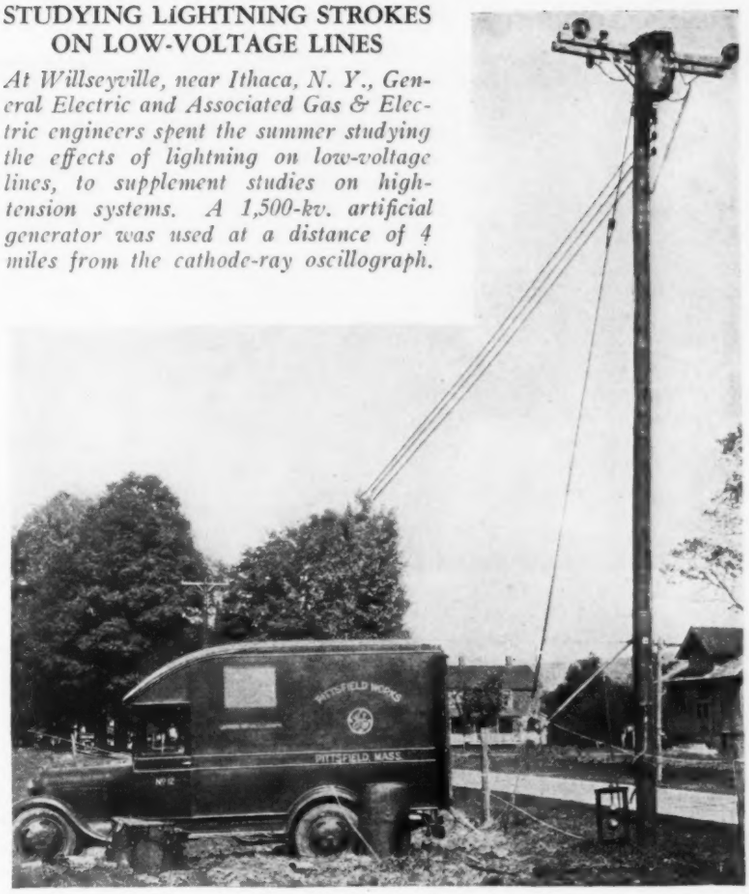
The initial 75-mile stretch of 110-kv. line on the eastern side of the Hudson, of which 30 miles south from Albany is already built, will now be pushed to completion, employing many men, at a total cost of $7,500,000. It will make very substantial operating economies possible to both the systems involved.

This happy result was brought about when, despite some fears to the contrary, a speedy agreement was reached between Floyd L. Carlisle, chairman of the Niagara-Hudson Power Corporation, and Frank P. Walsh and Delos M. Cosgrove of the New York State Power Authority, who met last week to clear up the obstacles to expedition.

Stipulations made by the Power Authority and reported last week (page 806) were acceded to by Mr. Carlisle, and immediate notification to that effect was made to Chairman Maltbie of the Public Service Commission. These stipulations are incorporated in the commission's order. By them the company will waive all claims to compensation for any vested interests in public property utilized in construction of the transmission line, in the event that the Power Authority later is authorized to build a transmission line for distribution of the St. Lawrence power. It is also specified that the projected company line shall not be used for the transmission of power which it may take over from the state under a distribution contract except on terms stipulated by the Power Authority.

STUDYING LIGHTNING STROKES ON LOW-VOLTAGE LINES

At Willseyville, near Ithaca, N. Y., General Electric and Associated Gas & Electric engineers spent the summer studying the effects of lightning on low-voltage lines, to supplement studies on high-tension systems. A 1,500-kv. artificial generator was used at a distance of 4 miles from the cathode-ray oscillograph.



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Power Authority Dissents from Secretary Stimson's Views

In another letter addressed, under date of November 10, to the United States Secretary of State, Frank P. Walsh, chairman of the Power Authority of New York State, disputes Mr. Stimson's views concerning federal jurisdiction over power development on navigable streams and asks:

"In its negotiations with Canada and in the recommendations to Congress resulting therefrom will the federal administration recognize the sole ownership of the State of New York in the waters of the St. Lawrence River and the lands lying thereunder within its boundaries, as well as its right to develop and dispose of the hydro-electric power derived therefrom; subject only to the conditions, (a) that the state agree to pay its fair share of the cost of the entire project, and (b) that the plans of the state for the development of the hydro-electric power are in conformity with the plans of the United States government for the promotion and protection of navigation and commerce?"

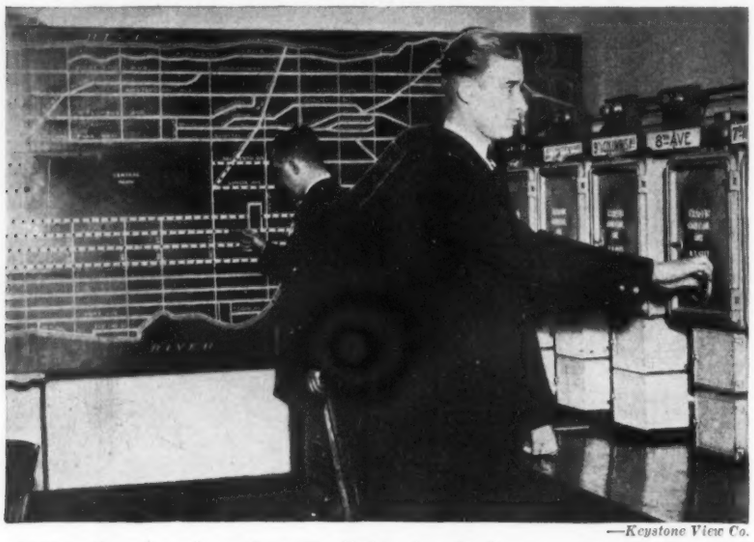
"An unfavorable answer to this question," Mr. Walsh says, "might conceivably frustrate the desire for harmony and co-operation expressed in your communication, and to the achievement of which the Power Authority stands ready to give its earnest and conscientious effort."

▼

Premier Taschereau Airs Quebec's Resentment

SPEAKING AT THE OPENING of the Quebec Legislature on November 5, Premier L. A. Taschereau announced that the House would be invited to bring down a resolution outlining the stand to be taken by the province in re-

HERE ELECTRICITY LETS FIVE MEN DO WORK OF 7,000



—Keystone View Co.

Automatic operation of traffic light signals from a control room in police headquarters is said to save New York City $5,000,000 a year as compared with the cost of individual operation of traffic towers.

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gard to the St. Lawrence development project, which, he declared, would mean the expenditure of hundreds of millions of dollars by Canada to assist the United States in developing power. The province, the Premier said, had been "slighted" in not being invited to participate in the negotiations with the United States.

▼

Business Revival Seen by Electrical Wholesalers

SPECIALIZED SELLING is the means through which electrical wholesalers will be enabled to meet the new conditions which will be the inevitable aftermath of the business depression. This was evidenced by the stress laid on opportunities for specialization in the program of the fall convention of the National Electrical Wholesalers' Association at Cincinnati, November 9 to 12.

Outstanding on the program was an address by W. C. Allen, sales manager of the Black & Decker Manufacturing Company, on opportunities for the sale of electric tools. In this paper the tremendous possibilities for sales in the contractor field were outlined. Following a comprehensive report on electric refrigeration sales by the refrigeration committee a canvass taken at the meeting showed that more than 20 wholesalers in the group were already engaged in this business and that many more were considering expansion along this line.

Although there are unmistakable signs of business revival in the industry, there is still the utmost need for increased operating efficiencies, stricter credit policies and careful analysis and planning of sales activities, according to B. W. Clark, chairman of the association, who also urged active co-operation of wholesalers with other branches of the industry, especially with utilities, and participation in the work of local leagues.

By invitation of the Federal Trade Commission a trade practice conference of the electrical wholesaling industry was held on Wednesday afternoon. Commissioner Charles H. March presided and M. Martin Flannery, director of trade practice conferences, was present. Thirty-three resolutions covering important trade problems in the industry were adopted by the conference and will be passed upon by the commission at a later date. About 175 wholesalers and manufacturers attended.

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Central Station Sells CO_2 as a By-product

USING AS RAW MATERIAL by-product stack gases from Station A of the Pacific Gas & Electric Company, the California Carbonic Ice Company plans to erect in San Francisco early next year a 50-ton solid-CO_2 plant and to have it in production about April 1. The new plant will be the first to use by-product gases from a plant burning natural gas.

Four million pounds of CO_2 are said to be available each day. The gas is free from sulphur, which simplifies purification. Though it contains large amounts of water vapor, it is planned to condense this to obtain a distilled water of high purity to be used as boiler make-up water for the power plant.

Trumbull Declares for Swope Stabilization Plan

EX-GOVERNOR J. H. TRUMBULL of Connecticut, now president of the National Electrical Manufacturers' Association, spoke to 900 electrical men on November 5 at Chicago when the Electric Association of that city held its annual dinner. His subject was insurance against unemployment. Mr. Trumbull indorsed the plan proposed by Gerard Swope, president of the General Electric Company, as one of the most constructive suggestions yet made for the stabilizing of business. The special committee of the N.E.M.A. appointed to study the Swope plan, he said, will soon present a recommendation based on the Swope plan for the organization of unemployment insurance by the electrical manufacturing industry.

Citing the change that has come in the human relations of industry with the passing of the small plant and the rise of great corporations, involving vast distances between the workers and the management, Governor Trumbull said that Mr. Swope has offered the best solution to the resultant problems. It cannot be adopted *in toto* under the present anti-trust laws, the Governor believed, but it can be largely applied in principle and purpose. He expressed himself as doubtful whether social progress can be accelerated by special legislation, because such action usually brings new problems no less difficult. The Swope plan does not seek to force insurance against unemployment by legislation, but by experiment and trial. Just as the N.E.M.A. has been effective in increasing the stability of the manufacturing operations of the industry in difficult times, so, he thought, should it make the effort to bring stability to employment within the industry through the co-operation of the management and the worker.

"I fail to see where our government is going to be able to stand up under many recurring conditions such as we now have," said Mr. Trumbull. "Each depression is bringing many of our people nearer to a socialistic point of view. These recurring conditions might well lead us into a serious situation some time in the future.

"The turning point from depression," he added, "is coming gradually because of the recuperative forces within the world of business itself. Government action can do little to help. Those companies which are sitting still and waiting for business to return, making no preparations for the coming demand for new and better goods, are missing a great opportunity. They will be far outdistanced by competitors foresighted enough to take advantage of this slackened business period to introduce new products and new methods."

Cleveland Bond Issue Lost, Not So in Eaton and Piqua

DEFEAT MET THE proposed bond issue of $2,500,000 for expansion of the municipal light plant at Cleveland at the recent election. Although a majority of the electors voted for the proposal, the affirmative vote fell short of the 60 per cent required for city bonds of this kind.

Two other Ohio cities voted heavily for bond issues for the construction of municipal plants. Eaton voted for a bond issue of $233,000, while Piqua approved an issue of $810,000. The bond issue in Eaton was fought by the Eaton Lighting Company, an Insull-owned utility which now serves the town. The company's franchise expires January 1. The vote at Piqua was 2,514 for the issue to 1,221 against it. In Eaton it was 1,610 to 200.

▼

Great Lakes Meeting Is Devoted to Safety

THAT ELECTRIC UTILITIES are headed for federal control, at least so far as the operation of holding companies is concerned, was the opinion expressed by Dr. L. M. Sears of Purdue University to the Engineering Section, Great Lakes Division, N.E.L.A., at its fall meeting in Lafayette, Ind., last week. Dr. Sears urged the utilities to prepare against the danger he saw threatening them and to mend their fences—preferably by reducing rates—so as to leave no weak spots against which political attacks can be directed.

Dean A. A. Potter of the Purdue Engineering College predicted a day of reckoning for those companies that in panic over present conditions have drastically reduced their engineering forces and have given the trained engineer no more consideration in this respect than is accorded to casual labor.

This meeting of the Engineering Section was built around the general subject of "engineering as a safeguard in construction and maintenance of electrical equipment." Several papers dealt with the personal aspects of accident prevention in regard to training employees.

The effect on public relations of intelligent work for the prevention of accidents was discussed by G. C. Neff, Wisconsin Power & Light Company. J. R. Eaton, Consumers Power Company, discussed the sources and methods of elimination of voltage hazards on overhead lines. Very interesting conditions in regard to safety grounding of lines were brought out by Mr. Eaton and by H. T. Burgner, Illinois Power & Light Corporation, who discussed the Eaton paper. It was contended that it is not enough to throw a ground chain over a transmission line, because there are certain voltage conditions that may be set up on the line by lightning, by mistakes in closing switches and by electrostatic and electromagnetic induction in which the single ground chain affords little or no protection.

C. H. Black, General Electric Company, showed how considerations of safety for men, service and equipment have been applied in the developments and applications of metal-inclosed switchgears. The great strides that have been made in recent years in meter design and in the design of associated equipment were recited by A. Brettman of the Milwaukee Electric Railway & Light Company. Safety principles and practices involved in the joint use of poles and inductive co-ordination efforts and in underground construction were discussed in papers by Frank F. Fowle and R. L. Dodd.

Concluding the open engineering session, Dean Potter presented an evaluation of the place of research in engineering education, bringing out the point that research in universities could not only be carried out in general at less expense than in industrial laboratories but that also it gave to students and to faculty alike an invaluable contact with practical problems.

The meeting of the Engineering Section furnished a suitable occasion for the dedication of the Thomas Duncan Memorial addition to the Electrical Engineering Building of the university. As is quite fitting, this addition, erected from a bequest in Mr. Duncan's will, is principally devoted to electrical measurement and vacuum-tube research.

Thomas Duncan, Scotch emigrant, inventor, pioneer in electrical measurement and founder of the Duncan Electric Company, died Jan. 21, 1929.

Great Electromagnet for University of California

THROUGH GIFTS AND LOAN of apparatus by the Federal Telegraph Company and the General Electric Company and financial support from the Chemical Foundation and the Research Corporation, the University of California will have in operation on the Berkeley campus by Christmas what, it is said, will be the largest electromagnet devoted to research and one of the largest of any description in the world. This announcement is made by President Robert G. Sproul.

Castings for the electromagnet are the gift of the Federal Telegraph Company. The magnet is one of four constructed during the war for high-frequency radio transmission. Two were sent to France and are still in use there. The other two were destined for China, but because of the Armistice were never shipped. The General Electric Company has offered to furnish transformers to use with the 85-ton magnet. It will be housed in a testing laboratory and will be used primarily by the department of physics in work on the nucleus of atoms.

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San Diego Council Wants City Street-Lighting Plant

WHAT APPARENTLY AMOUNTS to an offensive by the City Council of San Diego, Calif., against the San Diego Consolidated Gas & Electric Company has culminated in the adoption of an ordinance providing for calling bids for a municipal power plant to supply energy for the downtown ornamental lighting district. The ordinance also provides for calling an election on December 15 to amend the power company's franchise to enable the people to exercise a referendum on it after the city's new charter goes into effect. The voters will also be asked to amend the franchise so that the city may collect a 2 per cent franchise tax on money paid by the street-railway company to the power company for electrical energy.

In addition to adopting this ordinance, the City Council unanimously asked that the Railroad Commission hold a hearing on the rates and practices of the San Diego Consolidated Gas & Electric Company, and it also instructed the city manager to find out why instructions relating to putting wires underground in the downtown section had not been obeyed by the power company.

The municipal program has been adopted despite the opinion given by Lester Ready, consulting engineer, that the installation of the desired equipment would increase the charge for

street-lighting service during the first five years' operation about $30,000 annually (ELECTRICAL WORLD, September 12, page 445). After Mr. Ready had rendered his report the Council decided to award the street-lighting contract to the private company, but activity by J. V. Alexander, vice-president of the Council, and two reports filed by D. L. Bissell, an engineer who studied the rate situation, brought the change of plan.

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Wisconsin Commission's New Accounting Rules

FORMAL HEARINGS on proposed changes in the unit classification of accounts for class A electric companies were begun by the Wisconsin Public Service Commission on November 2. To facilitate the work of modernizing the classification so as to avoid long-drawn-out arguments the commission appointed four of its experts to confer with a committee representing the companies. Before adjournment to November 16 the commission made two rulings as follows:

1. Class A electric utilities shall account for depreciation either on a straight-line or on a sinking-fund basis as the commission may direct in specific cases, and pending the completion for individual utilities of procedure contemplated with reference to depreciation each utility shall be permitted to continue its present practice in providing for the reserve.

2. The commission will provide that amounts to be carried in fixed-capital purchase adjustment shall be amortized, in accordance with the same method employed for the general depreciation accounting of the individual utility, over the estimated life of the property of which a portion of the purchase price appears in the adjustment account, or in accordance with such other method as the commission may permit or prescribe in connection with the authority to purchase.

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Negotiated Rates for Upstate New York

IN ANNOUNCING AN electric light rate reduction affecting ten upstate counties in New York State Milo R. Maltbie, chairman of the Public Service Commission, reaffirmed last week his belief in the efficiency of rate negotiations such as produced the present New York Edison system schedule, as opposed to long-drawn-out rate cases. The upstate reduction, which applies to the New York State Electric & Gas Corporation, a subsidiary in the Associated Gas & Electric system, was effected through negotiations initiated by the commission.

The new rates begin with a fixed charge of $1 for the first 7 kw.-hr. used monthly. Rates are graded down to 2 cents. Oneonta, Ithaca, Cooperstown, Canastota and Norwich are among the places affected. A saving of $130,000 a year is estimated.

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Hydro on the Guadalupe and on the Rio Grande

TWO HYDRO-ELECTRIC PLANTS for the Texas Hydro-Electric Company have just been placed in operation on the Guadalupe River near Gonzales, and a third plant is nearing completion on the same river, near Seguin. The three projects are costing about $2,000,000. The two completed are furnishing power for the Central Power & Light Company, and the third plant will sell its power to the San Antonio Public Service Company. Three previous plants on the river between New Braunfels and Seguin were completed by the Texas Power Corporation about three years ago, the output being sold to the San Antonio company. Each of the three new dams is 200 ft. in length, a power house being built on the south side of each dam.

Good progress is being made with the 12,000-hp. hydro-electric plant which the Central Power & Light Company is building on the Rio Grande in the Quemada Valley, Tex., as an adjunct to the gravity irrigation system being developed by the Maverick County Irrigation District at a cost of $7,700,000. The hydro plant will pay for the right to use the water $275,000 a year for ten years and then $250,000 for 30 more. It will be ready for operation about March 1.

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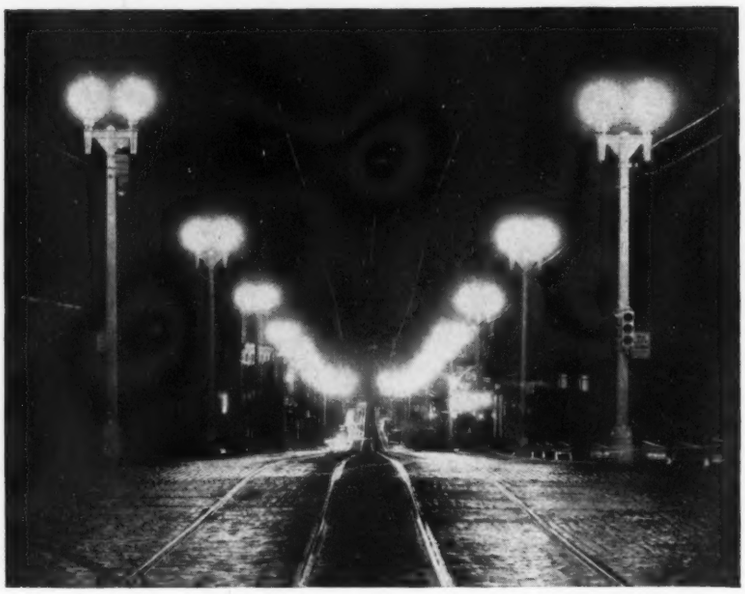
Copious Program Ready for Coal Conference

NEARLY 100 PAPERS by scientists in fifteen nations, some of whom have international reputations, are listed in the program prepared for the third International Conference on Bituminous Coal, to be held at Pittsburgh all next week. Economics of the coal industry, pulverized coal, smoke and dust, gasification, hydrogenation and liquefaction, low-temperature and high-temperature distillation, coal cleaning and preparation, byproducts, origin and classification, domestic heating, metallurgy and competition of coal with other fuels are the chief general classifications of topics.

Among the foreign delegates will be Dr. Franz Fischer, Dr. Friedrich Bergius, Dr. Ernst Berl, Richard Roosen, Friedrich Schulte and Rudolf Pawlikowski of Germany; C. M. Stein and André Kling of Paris and Profs. R. V. Wheeler and Cecil H. Desch, University of Sheffield, England.

PITTSBURGH'S FIFTH AVENUE NOW HAS "WHITE WAY"



Co-operation of merchants, lighting engineers, city officials and the Duquesne Light Company has given the busiest shopping district in Pittsburgh a half mile lighted by 146 6.6-amp. luminous-arc lamps mounted on 73 ornamental steel poles spaced 80 ft. apart. This is more than double the previous rating, which was good for 1915.

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Scattered Happenings in the Electrical Sphere

UNITED STATES

No More Ex Post Facto Licenses

Announcement has been made by the Federal Power Commission that in future it will issue no licenses legalizing transmission lines already constructed on public land. In the early years of the commission it was forced to do this, but persistence in such a practice after twelve years would be inexcusable, the commission says, and henceforth all power lines constructed upon any public land or territory prior to application for license will be considered by the commission as in trespass, unless the applicant can show it has not been guilty of willful disregard of law, or that it acted only in an emergency to serve a present public interest.

New Steam Plant for Herndon, Calif.

A 50,000-kw. steam-electric generating plant is soon to be built by the San Joaquin Light & Power Corporation at Herndon, Calif., where the company already has completed a substation built at a cost of $600,000. Including a million-dollar pipe line to bring natural gas from Kettleman Hills, the new plant will cost $5,610,000 exclusive of the substation.

Pemigewasset Dam to Be Raised

Authority has been granted by the Public Service Commission of New Hampshire to the Public Service Company of New Hampshire to increase the height of its dam across the Pemigewasset River in the towns of New Hampton and Bristol and across Ayers Island. The company asked a 21-ft. increase in the height of the dam proper and for permission to use 8-ft. flashboards. Estimated cost is $865,000.

Rate Revision in Order in Denver

Herbert S. Sands, consulting electrical engineer of Denver and president of the Denver Chamber of Commerce, has been employed by the City Council to investigate the rates charged for electricity and gas by the Public Service Company of Colorado. This is in line with a stipulation in the franchise that every four years the profit and loss columns will be a guide to rate revision. In 1927 Ray Palmer of New York, engineer, placed a valuation on the Public Service's property of $31,000,000.

Chicago Lighting School Successful

Successful completion of its second major lighting school is reported by the Chicago Lighting Institute. The school was sponsored by the Great Lakes Division of the National Electric Light Association and was in session from October 26 to October 30 inclusive, having a total enrollment of 117, representing nine states.

Light for Another New York Bridge

Under an arrangement similar to the one now in effect on the George Washington Bridge across the Hudson and in the Holland Tunnel, the Public Service Electric & Gas Company of New Jersey will furnish half of the electricity for lighting the new Kill van Kull bridge connecting New Jersey and Staten Island, which is identical with Richmond Borough, New York City. The Staten Island Edison Corporation will furnish the other half. The bridge roadways will be lighted by 182 lamps of 300 watts capacity.

New Skagit-Seattle Right-of-Way

The Seattle City Light Department will start work soon on improvement of the 120-mile right-of-way for the new transmission line between the Skagit River and Seattle at a cost of $110,000. The line itself will cost approximately $1,500,000 and will transmit power from the Diablo power plant.

Plans for Lighting Mammoth Cave

Plans submitted by General Electric engineers for spectacular interior lighting of the Mammoth Cave in Kentucky, involving the use of projectors and mobile colors, are under consideration by the Mammoth Cave State Association, which expects to turn over the property to the federal government for a national park. Preliminary contracts have been placed with the General Electric for lighting a new 185-step tunnel entrance, and the Kentucky Utilities Company will install the equipment.

P. G. & E. to Build Brush Creek Plant

By agreement with the Sacramento Municipal Utility District the Pacific Gas & Electric Company will lease the water to be impounded by the city at the Silver Creek dam and use it for the generation of power. The voters will be asked to approve a bond issue of $10,800,000 for the construction of the water project and one for $1,800,000 for the construction of conduit and tunnels to Brush Creek, where the company will spend approximately $2,500,000 on a power house with a capacity of between 26,000 hp. and 30,000 hp.

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Coming Meetings

International Conference on Bituminous Coal—Pittsburgh, Nov. 16-21. T. R. Alexander, Carnegie Institute of Technology, Pittsburgh.

American Society of Mechanical Engineers—New York, Nov. 30-Dec. 4. C. W. Rice, 29 W. 39th St., New York.

North Central Electric Association—Commercial Section, Lowry Hotel, St. Paul, Jan. 22 and 23; Engineering Section, St. Paul Hotel, St. Paul, Feb. 22 and 23. J. W. Lapham, 803 Plymouth Bldg., Minneapolis.

American Institute of Electrical Engineers—Winter convention, New York, Jan. 25-29. F. R. Hutchinson, 33 West 39th St., New York.

Georgia Power and Augusta Canal

An offer to buy the surplus output of the proposed hydro-electric plant on the canal at Augusta, Ga., which the city will build has been made to the Augusta City Council by the Georgia Power Company. The company estimates that it would use 67,000,000 kw.-hr. a year, for which it would pay $187,000. This, it estimates, would give the city a net profit of $52,000 after paying costs of maintenance and supplying its city lighting. The company asks for a 50-year contract with the right to cancel at the end of 25 years. The city is to promise not to compete with the company.

CANADA

Two Units in Operation at Chats Falls

Two units of 28,000 hp. each have been brought into production at the Chats Falls development, on the Ottawa River, by the Ottawa Valley Power Company, while another two are reported to be ready for operation. Eight units will comprise the initial installation, having a capacity of 224,000 hp., and the Ontario Hydro-Electric Power Commission will buy all the primary power generated.

Gatineau Company Sells 453,800 Hp.

The Gatineau Power Company has begun the delivery of an additional 16,000 hp. of primary electric power to the Hydro-Electric Power Commission of Ontario under two of its long-term contracts with the commission. These additional deliveries raise to 304,000 hp. the total quantity of primary power now being delivered by the Gatineau Power Company to the commission and increase to 453,800 hp. the aggregate amount of power being sold by the company on all its primary power contracts.

Far Northern Port Gets Electricity

Too far from settled territory to permit the building of a power transmission line, Churchill, Manitoba, on the shores of Hudson Bay, where a modern port with grain elevator has been constructed, now has a steam-electric plant with a rating of 3,600 kw. Standard equipment furnishes energy both to the elevator and the embryo city.

ABROAD

Another Great Soviet Hydro Project

According to agents of the Soviet government work is to be started early in 1932 on a 1,548,000-hp. hydro-electric plant on the Volga River, near Samara. It is designed to be the largest water-power plant in the world. In connection with the project it is proposed to establish aluminum, copper, chemical and other industrial enterprises at an ultimate cost put at about $3,000,000,000. This Volgastroy plant will be a part of the so-called "Great Volga" project, to include four hydro-electric stations on the Volga and three on the Kama River.

A waterfall built to order

Tumbling riotously through a fall of 80 ft., this man-made cataract is one of the notable features of Golden Gate Park, San Francisco. It is known as Rainbow Falls.

With an old quarry to furnish the cliff and pool and with a 1,000-hp. electric pump to deliver 2,000 gallons a minute the water problem was solved.

In the 80-ft. fall there are submerged 80 250-watt floodlights, some clear, others red, blue, green, amber and yellow, which change automatically to furnish the 120 color combinations.

EDITORIALS

L.W.W.MORROW
Editor

Emphasis renewed on functional lighting

SYNTHETIC lighting was the name given by George E. Shoemaker, in a paper presented before the Illuminating Engineering Society, to a suggested approach to the solution of various problems in artificial illumination. Mr. Shoemaker's idea is that "while it is proper to study the appearance and efficiency of light-giving devices, in solving any lighting problem the first step is to decide what the lighting should help us see and from what direction the light beams might best come to be most effective." This is certainly a reasonable basis for approach, and Mr. Shoemaker has devised some interesting applications of this principle.

Geometric shapes and patterns of light thrown upon work, displays or occupied areas of a general nature serve to carry out this scheme. Wide cones of light may be produced by floodlamps or prismatic reflectors, narrow cones by show-window and condensing-lens spotlights, pyramids by asymmetric show-window reflectors or open outdoor floodlamps designed for rectangular areas, cylinders by groups of prismatic control plates with lamps at focus, and wedges by close-spaced lamps or gaseous tubes in cylindrical reflectors.

The plan works out well. A merchant may emphasize the material in his store rather than the sales person or showcases. In a display of equipment attention is all but irresistibly drawn to the products offered. In a drafting room glare, reflections and shadows are abolished. In a machine shop with a 90-degree cylindrical light source a similar result has been obtained for bandsaw operations. In the floodlighting of buildings and the illumination of large interiors the principle finds useful application. Essentially what Mr. Shoemaker advocates is control, for functional service and effects, of what would otherwise be plain bulk lighting. Not an entirely new conception, he has nevertheless given it renewed vigor and applicability.

Honors are always earned

GREAT men of science are modest. They subordinate themselves to their discoveries or contributions and look upon themselves as instruments whose probing and cutting produce worth-while results. Their contributions count only because these measure their efficiency in the discharge of their duties and responsibilities. They believe that their endowment of brain capacity is only an overpowering and fortunate inducement for them to act as intermediaries between man and nature. In no other way can one account for the quiet, unassuming and charming personalities found among the electrical pioneers.

Thus in celebrating the careers of Faraday, Maxwell and Henry this year the world pays homage chiefly to the manner in which these men discharged their obligations to mankind rather than to their discoveries. The esteem in which they are held is personal and intimate. They are singled out as men whose lives can be set before the world as examples to follow, and interest is greatest in the personal incidents associated with their careers. As individuals they have met the highest social standards, and their unselfish devotion to duty has brought them honor without stint because this was also associated with productive capacity. These men approached our ideals of human ability and conduct.

Dealers name their own ticket

DEALERS who have been active in getting the power companies out of the merchandising business by legislation or otherwise will be interested in what has happened in one case where the power company voluntarily withdrew from the field and they had things all their own way for a year. Twelve months ago dealers in Long Beach, Calif., asked for an opportunity to prove that they could do the task of selling appliances. They were destined to bring upon themselves a new type of competition and to prove the prophecy that inevitably the manufacturer would seek new and stronger outlets to protect volume as soon as the constructive force of the power company was withdrawn.

True it is that dealers were handicapped by taking over a sales job that had been force-fed by the power company, that they undertook to do a range-selling job when saturation in the territory was only 2 per cent, that business conditions in the particular locality were very poor, and that gas-range sales were only one-third normal. These were very serious handicaps, and dealers cannot be blamed if the results of their effort failed to meet their expectations. The point is that the thing which has happened in Long Beach will take place in every other community where the power company withdraws.

A specialty store entered the field carrying a full line of a certain manufacturer's household appliances. Fifteen trained salesmen were put into the field and results are speaking for themselves. This one outlet has not approached the over-all selling that could have been accomplished by dealers in the territory working with the co-operative support of the power company, but the business thus stimulated has reached a satisfactory volume; indeed, the store is making money. The same thing has happened in the San Joaquin Valley of California, where the power company withdrew from merchandising six months ago.

This is a type of competition the dealer did not anticipate when he was so anxious to get the power company out of the picture. It might easily have been a case of co-operative effort with all dealers sharing in the business on a more nearly proportionate basis. Now it is a case of strictly competitive selling, and the dealer best organized to sell will reap the bulk of the business.

Which is more in the dealers' interest, this type of competition or a co-operative plan with all agencies working hand in hand to develop the tremendous market that is only half supplied at present?

Functional assignments for engineers

QUEER things unintentionally and unexpectedly happen because people are swayed by ambitions, by the current of pressing events and by the exigencies of the moment. That may be why many utility engineers have occupied themselves with matters more within the province of the design engineers of the manufacturers and, conversely, why the manufacturers' engineers have busied themselves with operating problems. Now both groups are in the doldrums because of decreased budgets and curtailed production. This is no consequence of the intershift of functions. It does, however, have a bearing on the resumption of the wonted prestige of the engineer in shaping the destinies alike of the electrical industry and of the electrical engineering profession.

Every instance that may be cited will bring forth evidence that the activities of both groups have been justified by circumstances. Nevertheless, the inherent character of many of these activities places them inherently in the opposite group. System operating technique, stability studies, the vagaries of lightning and of grounding are operating problems and should be solved by the operating experts. Circuit-breaker design, perfection of factory-built assemblies in switch and generation facilities, development of standardized distribution systems are primarily tasks for the manufacturers' engineers.

Admittedly both groups must collaborate in all the forward strides. The time, however, has arrived for a critical analysis of the respective programs with the end in view that each group shall apply itself aggressively to the type of development problems that give most promise of immediate tangible results when attacked in their most favorable sphere of action. Electrical engineering in the power field has been marking time. When the order to march is given let it find a moderate amount of realignment of functions the better to conquer the obstacles which have been accumulating in "No-Man's Land" during the listless year or two.

Stars, orbits and stability

STABILITY studies involve academic abstractions which apparently put them in the realm of the electro-mathematical engineer. For that reason it has been difficult for system planners and system operators to get the attention of executives attracted to the practical significance of stability technique to operating excellence and investment conservation. Thus it might come as a shock to some holders of the purse strings if they were suddenly confronted with the assertion that 30 per cent or more of their interconnection capacity is not being utilized because of fear of instability and the risk of impairing service. The unfortunate part of it is that the cost of ascertaining the workable and safe limits of power interchange is insignificantly small as compared with the cost of carrying capacity investment that gives no greater degree of security than does a foreknowledge of system capabilities.

Interconnected groups today embrace former local systems that are as diverse in magnitude and expanse as the planets and their orbits in our solar system. Those planets behave beautifully in a schedule in accordance with a divine plan. But just let an interstellar wanderer decide to join our solar family and proceed to pick an orbit for itself. What would happen to it and to the others would verge on the catastrophic. If man survived at all, he might become a complete biological misfit under the new order of orbits, solar distances, ecliptic angles and seasonal durations. The laws of celestial mechanics would account for all the elements of this new régime and afford the basis for precise prediction of the consequences.

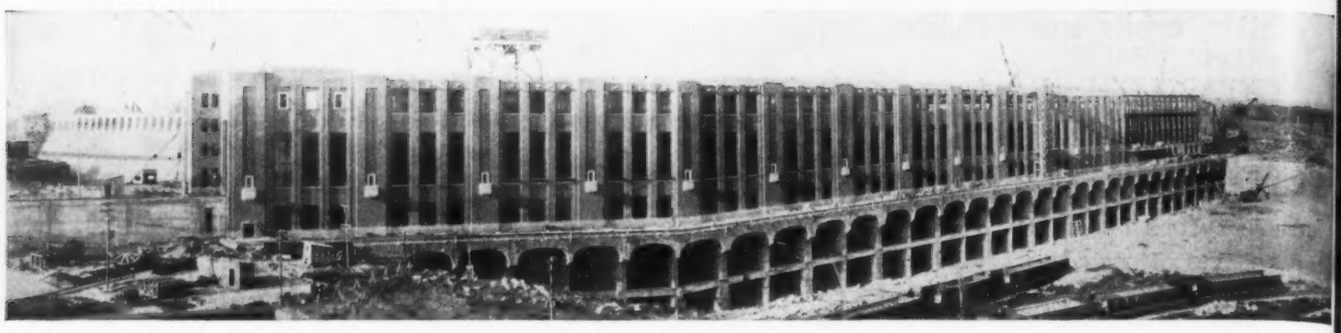
Such an astronomic cataclysm may well be viewed as a gross metaphoric exaggeration of what happens in a power system when a new power source is introduced or a new link of transmission injected. Nevertheless, every change in system operation and every change in system loading affects the behavior of every piece of equipment. It is an extremely intricate chain of events, but not by any means hopelessly so. The Einsteins of system stability can tell you the consequences in advance and with a high degree of certainty. They have developed the equivalent of the astronomer's ephemeris in the system calculating boards which have been made available in several laboratories. Those who have an eye to economy will give ear to the plea of system operators and system planners that stability analyses will defer many an unwarranted expenditure and many an unwanted service interruption.

Cable entrance standards deserve general adoption

AT A RECENT meeting of the underground systems committee of the National Electric Light Association the subject of standards for low-voltage cable entrances for manhole and network transformers was discussed and standards were recommended. This action was the first step in a program of standardization of certain features of underground equipment. This work was undertaken in order to make manhole equipment as interchangeable as possible; that is, make it possible to remove one piece of equipment and install another without having to sweat a new wiping sleeve on to the cable in order to accommodate a different type of cable entrance. In order to obtain this interchangeability there has been a recent tendency on the part of certain operating companies to prepare a set of standard cable entrances that would be peculiar to their system alone. Naturally, if this continues, a considerable burden in the form of increased costs will be imposed both on the manufacturing companies and on the operating companies.

After a series of conferences with the manufacturing companies, the committee adopted the proposals for low-voltage cable entrances with the recommendation that the manufacturing companies adopt them as their standards. At the time of the adoption of the designs proposed a resolution was passed requesting all operating companies to purchase manhole and network transformers having low-voltage cable entrances made in accordance with these standards.

The manufacturing companies have expressed not only a willingness but a desire to supply as standard equipment whatever the operating companies agree upon and recommend. Unless the operating companies in purchasing manhole and network transformers specify these standard low-voltage cable entrances, the economic and operating advantages will be lost. Why should not all companies purchasing this type of equipment conscientiously follow the recommendations of the underground systems committee and adopt them as company standards?



Beauharnois Harnesses St. Lawrence

Provision also made for deep waterway.

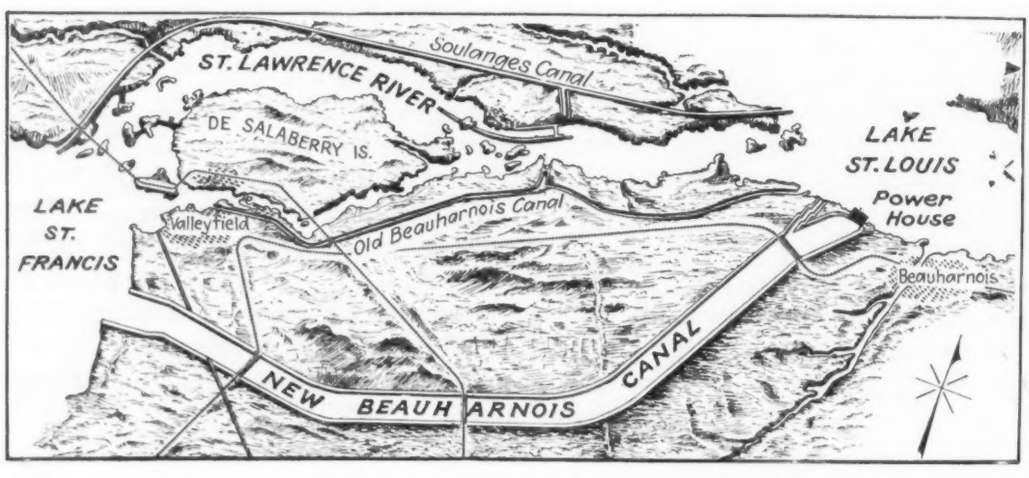
Electrically driven machinery the rule for excavation.

Four 50,000-hp. units constitute initial installation.

Six more to be added during next three years.

BETWEEN Lake Ontario and the Atlantic Ocean the St. Lawrence River has a total fall of about 243 ft., which holds a potentiality of 5,000,000 hp. of electrical development. In the International Rapids section abutting Ontario and New York State is a 92-ft. fall in a 48-mile stretch with a potential capacity of 2,000,000 hp. Twenty-five miles west of Montreal is the Soulanges-Beauharnois section, in which the fall is 83 ft. (2,000,000 hp.) in the rapids between Lake St. Francis and Lake St. Louis. The river drops 48 ft. in the Lachine section adjoining Montreal and this holds out a promise of 1,000,000 hp. From Montreal to the ocean is 1,000 miles and the fall is only 20 ft.—too gradual to be useful for power purposes. The Beauharnois section is now under development and in such manner as to concentrate the entire potential output in one gigantic power house.

Nature was unusually kind in many respects in connection with the project to utilize the available head and flow of this district. The St. Lawrence now flows in two channels, which embrace De Salaberry Island between them before they merge into the rapids section. Paralleling this route, between Valleyfield and Beauharnois, is a flat terrain which geologists say was once the bed of the river or of an extension of Lake St. Francis. Marine clay underlies the top soil and there is no rock except at the edge of Lake St. Louis. Out of the 15-mile stretch there is only about 1 mile of boulder clay, the balance lending itself well to hydraulic dredging. Further than this, the route chosen for the canal lies below the level of Lake St. Francis, dikes having been built along its shore at the time when its level was raised incidental to the power developments already operating along the existing channel. As a consequence the provision of power and navigation channels involved a reduced amount of excavation and the mere construction of earth dikes ranging from 10 to 24 ft. in height. As the permissible amount of diversion increases three short regulating dams will be built from island to shore and island to island at the entrance of the river to its Soulanges section.



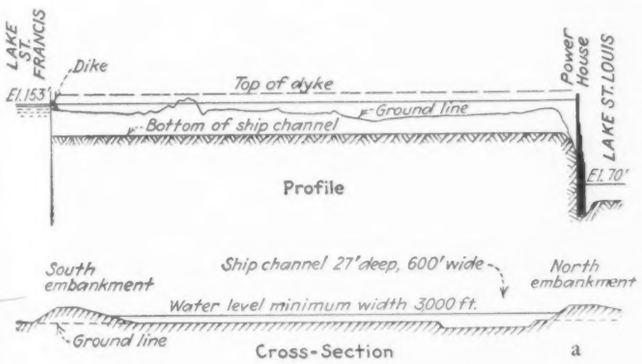
Fifteen miles of a new St. Lawrence channel

This plant will house a half-million horsepower

South dike will end at wing wall under construction at extreme left. Electric shovel is excavating tailrace to Lake St. Louis. Take-off towers to 220-kv. lines will be located between tailraces of successive sections of the plant.

for 2,000,000 Hp.

Another favorable aspect of the situation was the presence of the ledge some 1,000 ft. wide at the edge of Lake St. Louis. The power house is being constructed on the western edge of the ledge and the ledge is being excavated to form the 900-ft. tailrace to the lake. An additional 500 ft. of dredging is necessary to reach deep water. Also, the St. Lawrence in this region has hardly more variation in flow than it has at Niagara Falls and the development therefore realizes, similarly to the Niagara Falls plants, on a uniformity of flow that is hardly approached by any other river. The Beauharnois power project constitutes the development of the only site in the world where 2,000,000 hp. of firm power can be made possible in a single plant.



The average St. Lawrence discharge at this point is 220,000 cu.ft. per second; in 70 years it has not exceeded 318,000 nor dropped below 173,000 cu.ft. per second. Rights have been obtained from the government to divert 40,000 cu.ft. per second and the company has acquired the rights to divert a further 13,072 cu.ft. per second held by the Montreal Cotton Company. This utilization of about one-quarter of the whole mean flow therefore represents almost exactly one-fourth of the possible ultimate value of 2,000,000 hp. The present hydraulic works and plant are therefore being built for 500,000 hp. of output at an expenditure of about $130 per horsepower. As additional diversion is sanctioned or acquired from present holders the remaining 1,500,000 hp. can be developed at relatively little structural outlay. Application for the diversion of 30,000 additional cubic feet per second has been approved by the Quebec government, but not yet approved by the Dominion government.

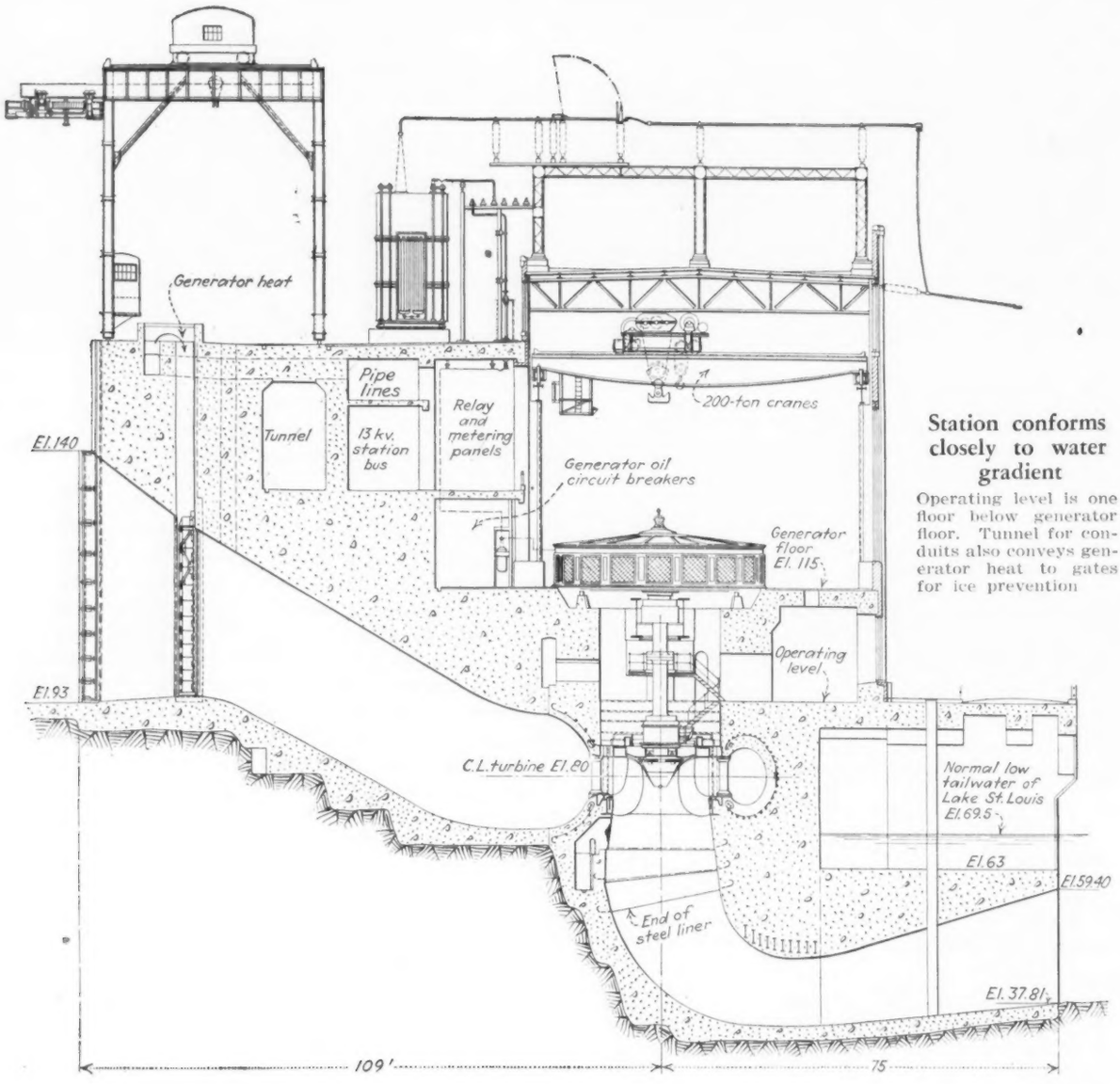
At present the dikes are being built 3,300 ft. apart. This will be the ultimate width of the canal. After the first unit goes into operation suction dredges will increase the width of the canal section by excavation as additional diversion is sanctioned and water required.

Ultimately the development will shift the entire St. Lawrence flow back to its prehistoric route in a new channel 3,000 ft. wide and 15 miles long, thence to be passed through 40 50,000-hp. wheels in a power house 3,000 ft. long. Six hundred feet of the width is now to be excavated to form a navigation channel 27 ft. deep,

Entrance at Lake St. Francis

(a) Little excavation required for shallow portion of power canal, but plenty for the ship channel.
(b) Top soil skimmed off by tower excavators to form main dikes and settling basins. Ship canal already excavated by hydraulic dredge.

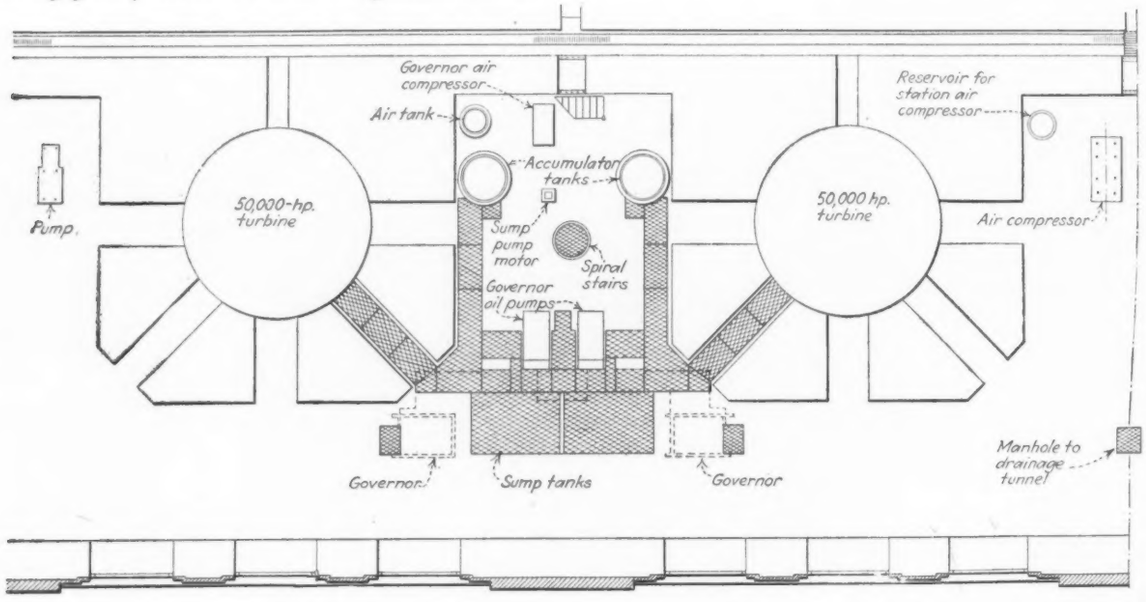
Courtesy
Compagnie Aerienne Franco-Canadienne



Station conforms closely to water gradient

Operating level is one floor below generator floor. Tunnel for conduits also conveys generator heat to gates for ice prevention

Operating gallery between wheel and generator levels



Electrically operated tower excavator builds the dikes with top soil

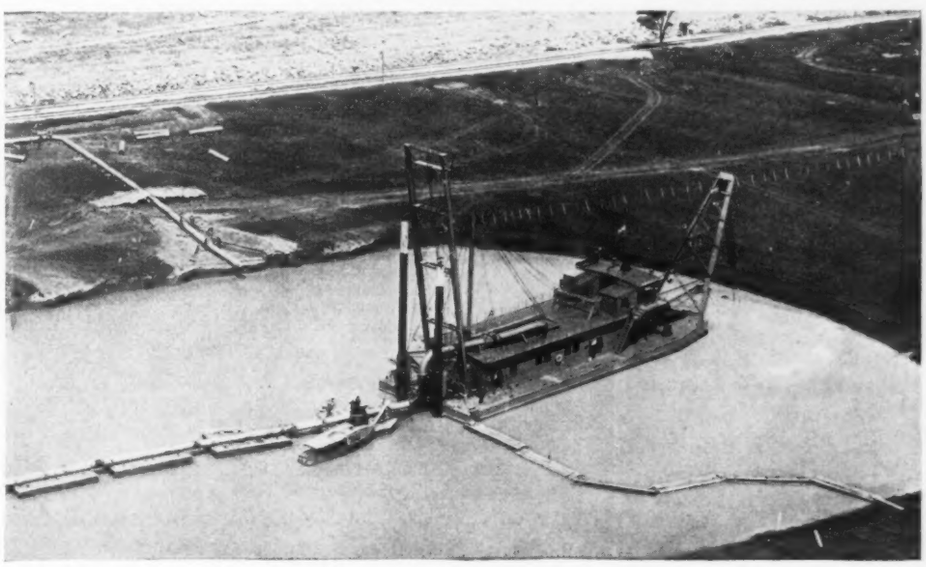
representing a $16,000,000 contribution of power capital to subsidize deep-water navigation in return for power development rights. This unusual width, necessary to keep scouring at low values when the entire flow is devoted to power production, will permit relatively high speeds of navigation without risk of additional scouring from steamer wakes. Of course the navigation channel cannot serve water travel until the government builds the requisite locks at Lake St. Louis.

The canal itself covers 8,000 acres; the balance of the 28,000 acres purchased by the company will be devoted to industrial development along its banks. Excavation of the power and navigation canal and the building of the dikes represents the moving of 30,000,000 cu.yd. of earth for the initial production of 200,000 hp. This material is being handled principally in three ways—tower excavation, drag lines and hydraulic dredging. All excavating machinery is electrically driven. The tower excavators move laterally on tracks, the rail tower being some 800 ft. distant toward the middle of the canal. The five tower excavators of 10-cu.yd. capacity buckets are all electrically driven, with Ward Leonard control, the conversion unit comprising a 600-hp. synchronous motor driving a 325-kw. hoist generator, a 150-kw. track cable generator and a 20-kw. exciter. The supply is 4,000 volts, three phase. The tower excavator is of the type developed for Mississippi levee work.

The hydraulic dredge has a 300-hp. wound-rotor induction motor driving the spiral cutter (7 ft. in diameter) and a 2,200-hp. induction motor drives the pump which takes in the material dislodged by the cutter and sluices it through a 26-in. pipe to the top of the dike, whence it flows into a basin forming the main dike and then into a settling basin between the main dike and a supplementary one some 600 ft. behind it. There is thus established a raised area for industrial exploitation along the banks. The dredge has a capacity of 1,000 cu.yd. per hour, and as well as advancing the 300-ft. channel 200 ft. in one day has removed as much as 820,000 cu.yd. in one month.

For excavation of the 1,300,000 cu.yd. of rock at the tailrace there is an 8-cu.yd. shovel driven by a total of 680 hp. in thirteen motors, the larger ones for hoisting (two 187½ hp. each), rotating (125 hp.) and crowding (100 hp.), being furnished with independent d.c. generators for Ward Leonard control. The shovel is seen in operation in the frontispiece of the October 3, 1931, issue of ELECTRICAL WORLD. The equipment weighs 550 tons, including the 30-ton dipper, and has a 65-ft. lift.

To supply the power needs of these and other excavating units, the stone crusher plant, shops, camps, etc., a block of 10,000 hp. was contracted for from Montreal Light, Heat & Power Consolidated. Two 44-kv. circuits were tapped at the eastern end of the canal and a 44-kv. line was run up the middle of the canal area. Substations providing 4,000 and 2,300 volts were set up at strategic points. The transformers are protected with automatic air-break switches, in which an overload coil trips the spring which the hand-



Electric dredge builds dike from canal excavation

Delivery pipe and 4-kv. power cable floated on pontoons; 7-ft. cutter swings circle to give 300-ft. width as dredge pivots about its anchor; 2,200-hp. motor sluices the material through a mile of pipe to the settling basin behind the dikes.

Courtesy Associated Screen News Limited

operated rod winds up in the closing operation. Disconnects only are provided on the low-tension side. The transformers for the dredge installation were made mobile by mounting them on stone boats, the 11-ton load being readily dragged to the new location by gasoline tractor. Bare copper is used for the secondary runs.

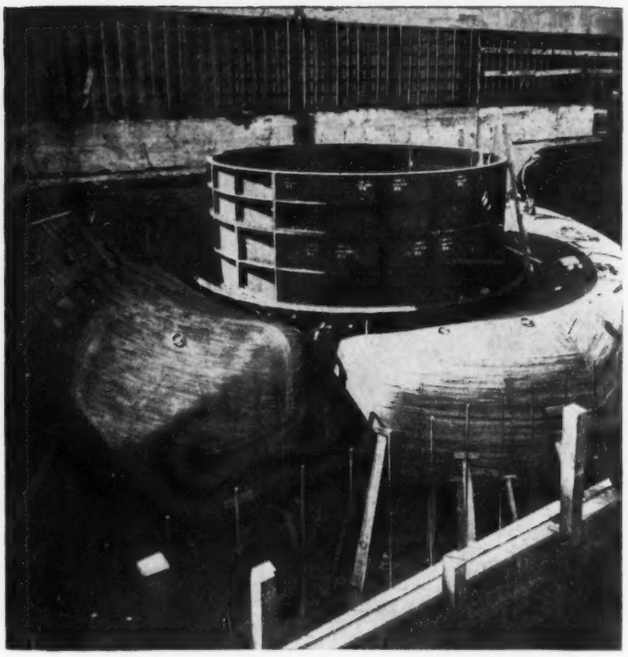
Initial output under contract at low price

Long-term contracts for 410,000 hp. have been negotiated at $15 per horsepower-year. Of these Ontario Hydro takes 250,000 and Montreal 150,000 hp. The first blocks of power for delivery October 1, 1932, necessitated the immediate installation of two 25-cycle and two 60-cycle units of 50,000 hp. each. These are all of Canadian General Electric manufacture. The station, however, is being built for a capacity of fourteen units of this size, of which six will be 25 cycle and four 60 cycle. Space is provided for two more units and two sluiceways, which may be filled by two units at a later date to bring the total up to fourteen. All the hydraulic imbedded parts are now installed for six of the additional units, which will be put in operation as contracts require them.

Between the two groups of 25-cycle and 60-cycle units is the sluiceway section. At the 60-cycle and office end of the station are two Canadian General Electric auxiliary units of 8,000 hp. each for station service, either of which is adequate for a total plant capacity of 500,000 hp.

A distinctive feature of the station design rests in the removal of the operating control from the generator floor to a level one floor below, between the waterwheel and the generator. W. S. Lee, who designed the station, chose this arrangement because such operations as must still remain close to the units pertain more to the bearings, brakes, governors, couplings, etc., than to the alternator. Attendance, therefore, is predominantly mechanical and this should dictate the structural layout and the location of control equipment and operating positions.

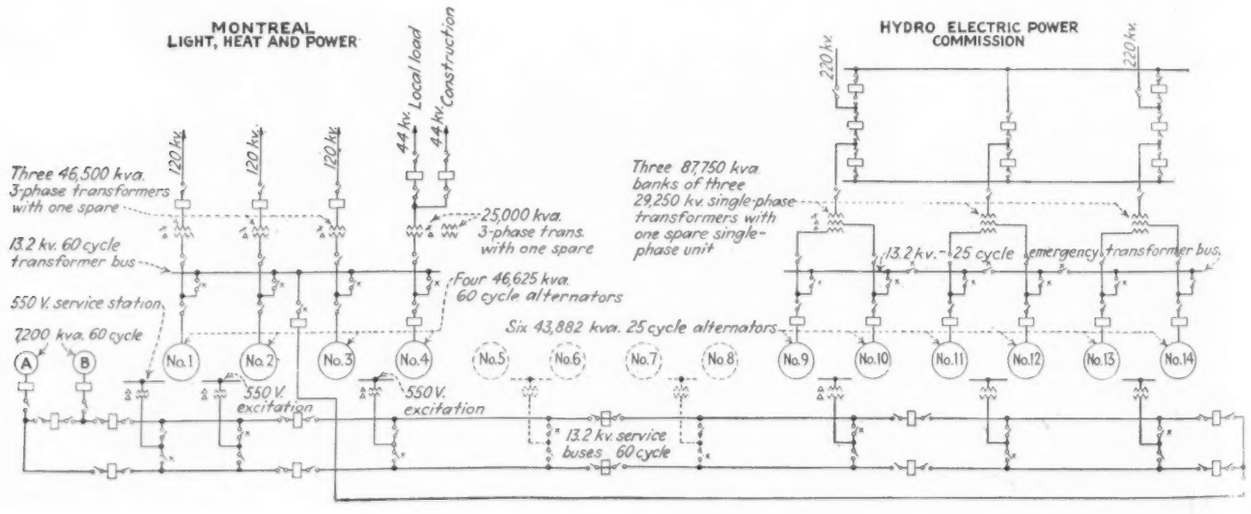
The pairs of machines are made right and left hand, with the control and governor equipment installed between them. Compressed air for cleaning and other uses, the oil system and sight feed and temperature indications are brought to this centralized operating station. The machine accessories are concentrated on this level and a thoroughly equipped machine shop is established on this same level at one end of the plant. This arrangement is expected to facilitate to a considerable extent the trucking and reinstallation of parts which have to be removed for maintenance attention. On the whole, the layout aims to shift the supervision of hydroelectric units to the area where experience has shown the bulk of the attention as being centered in present operating practice.



Two scroll intakes per wheel

Disconnects instead of oil breakers or main and service buses

Scheme laid out for handling later delivery of 150,000 hp. to Montreal, 250,000 to Ontario and 27,500 locally. Initial installation omits sectionalizing breakers in 13.2-kv. service bus and provides only spare breaker on initial single line to Ontario H.E.P.C. with transfer bus on 13.2-kv. side. Security in 60-cycle station service obtained by emergency tap from Montreal bus.



A tunnel is provided in the bulkhead to take care of power runs and miscellaneous control circuits. The oil and water piping for the transformers are to be in an adjacent compartment directly over the station bus gallery. Generator heat will flow through these ducts on its way to the headgates for the purpose of keeping them clear of ice, the gate runways being boarded over at the top.

Two alternators to a transformer bank

In the case of the 25-cycle units one bank of three Canadian Westinghouse 29,250-kva., single-phase transformers will be connected to two of the 50,000-hp. units. The low-tension (13-kv.) side will have two windings, one for each generator, and these will have 55 per cent reactance between them. Except as an emergency, the operation will avoid resort to a low-tension generator bus. Oil circuit breakers will be provided between the alternators and transformers in this 25-cycle tie to the Ontario Hydro system, but not in the case of the 60-cycle units allocated to the Montreal load. Three-phase Canadian Westinghouse transformers of 46,500 kva., one for each machine, are being installed in the 60-cycle end of the station. These are installed in two-piece tanks assembled by bolting together on the job. The core is shipped separately in a nitrogen-filled tank.

Here, then, is a hydro-electric plant which is a major component of the much-discussed St. Lawrence development. It provides the wherewithal for a deep waterway to supplement the Welland project, in anticipation of the International Rapids and Lachine developments for joint power and navigation purposes. In spite of the magnitude of its operation in rehabilitating the whole landscape between Valleyfield and Beauharnois, it is a relatively simple project as a result of the concomitance of many favorable topographical factors. It is strategically located, convenient to the Ontario and Quebec area, in which resides 60 per cent of Canada's population and 80 per cent of its industrial activity. Ten per cent of the dominion population lies within a radius of 25 miles of the plant.

Many steps must, however, intervene before the project can be extended to a complete diversion of the river. There must be co-operation with or acquisition of the rights of the other three plants operating in this section of the river. The Cedar Rapids plant of Montreal Light, Heat & Power Consolidated has 200,000 hp. in relatively small units using 30 ft. of head and 56,000 cu.ft. per second in summer, increasing to 75,000 in winter, when ice cuts capacities. The Canadian Light & Power Corporation plant, drawing 6,000 cu.ft. per second from the old Beauharnois canal, has 26,400 hp. installed. The Soulanges diversion canal, on the north side of the river, delivers 3,300 cu.ft. per second at 52 ft. head to 16,000 hp. of units. The unallocated water now going to waste amounts to about 100,000 cu.ft. per second, nearly half of the mean river flow. Utilization of the water now passing through these plants, totaling 260,000 hp. in capacity, would be capable of developing 700,000 hp. under the total head of 83 ft. made available at the Beauharnois plant. The utilization of the 100,000 cu.ft. per second now wasted would thus bring the total capacity of Beauharnois to the 2,000,000 hp. for which the hydraulic requirements are now being provided in canal and dikes.

Construction is being carried out by the Beauharnois Construction Company under the immediate direction of F. H. Cothran, vice-president and general manager. He has the following staff: D. F. Noyes, general superintendent; M. V. Sauer, hydraulic engineer; B. K. Boulton, electrical engineer; R. G. Watson, mechanical engineer. The engineering is in charge of the following consulting engineers: F. B. Brown, Montreal; T. H. Hogg, Toronto; A. S. Crane, New York, and William S. Lee, Charlotte, N. C.

Electrical Engineers Pay Homage to Edison

The physical life of Thomas Alva Edison, world benefactor, ended on Sunday, October 18, 1931. The spiritual benefits of his contributions to humanity continue to live.

His genius, vision, patience, persistence, industry and widely diversified talents, which brought to fruition many of his conceptions, have contributed greatly to the comfort, convenience and happiness of mankind, and his achievements constitute a great incentive and inspiration to those who follow.

In particular, his invention of the incandescent electric lamp and his conception, more than 50 years ago, of the combination of a central generating station with a suitable distributing system for electrical energy, firmly establish him as the founder of the electric lighting industry of the world.

He was the outstanding world leader in the group of inventors, scientists and engineers whose achievements in technology have produced great social and economic benefits, including the employment, in useful occupations throughout the civilized world, of tens of thousands of men and women.

He was respected and admired by his associates, who cherish their memory of his ability, simplicity and other personal characteristics.

Mr. Edison was, in 1884, one of the signers of the call for the organization meeting of the American Institute of Electrical Engineers, and he was elected a vice-president at the first election of officers; later he was elected an honorary member. His achievements caused a group of his associates and friends to establish the Edison medal, which is now awarded annually by this Institute.

The board of directors of the American Institute of Electrical Engineers* hereby records in its minutes this appreciation of the great debt which the world, and electrical engineers in particular, owe to his memory, and directs that a copy of this minute be sent to his family.

Meeting in Kansas City, Mo., October 23, 1931, in conjunction with district meeting.

An Innovation in Boiler Design

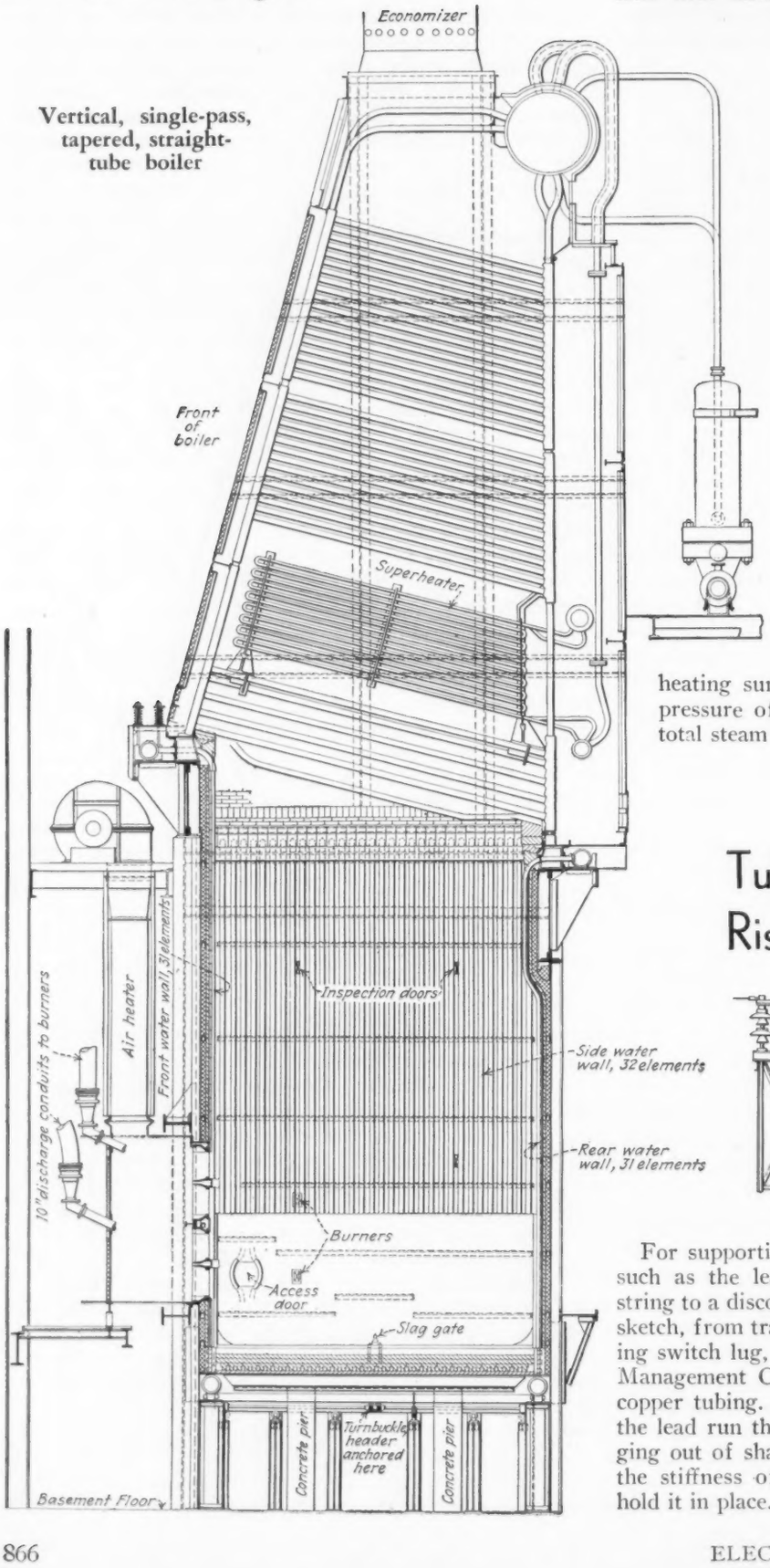
Introduction of what is said to be an entirely new design in boiler practice in this country has been made at the Bremo station of the Virginia Public Service Company. With the objective of obtaining the greatest possible heat utilization efficiency, the least material and superstructural requirements, low radiation losses and low draft losses, engineers of the Electric Management & Engineering Corporation, designers and builders of the station, developed what is described as vertical, single-pass, tapered, straight-tube boilers.

In this design, as indicated in the accompanying illustration, the gases flow from the burners to the stack in a vertical straight line. The tapered construction correlates the reduced gas volume, due to natural contraction through the heating zone as the temperature decreases, with the cross-section area of the passage.

The total draft loss from furnace to stack, including the air-heat-absorbing element, is only about 2 in. Economies in fan-motor requirements were consequently made possible with this free-flow arrangement of furnace gases.

Each boiler is of a maximum output capacity of 200,000 lb. per hour, normal 160,000 lb. per hour, and has a heating surface of 19,836 sq.ft. Operation is at a pressure of 525 lb. per square inch, and there is a total steam temperature of 825 deg. F.

Vertical, single-pass, tapered, straight-tube boiler



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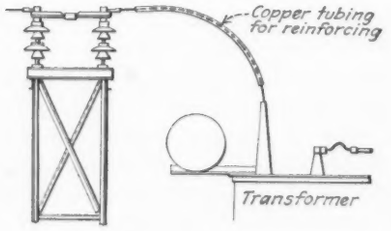
Tube Supports Rising Leads



For supporting conductors trained upward in a bend, such as the lead from the head of a strain insulator string to a disconnecting switch pillar, or, as shown in the sketch, from transformer bushing terminal to disconnecting switch lug, engineers of the Byllesby Engineering & Management Corporation frequently specify the use of copper tubing. This tube is bent into proper shape and the lead run through it. It prevents the lead from sagging out of shape. It is not fastened in any way, since the stiffness of the stranded conductor is sufficient to hold it in place.

Diesels as Peak-Load Units on Utility Systems

FROM time to time the idea has been broached that Diesel engines should be considered more extensively by electric light and power companies as peak-load or reserve units at the stub ends of transmission lines, for assuring service continuity in districts remote from generating stations, or for serving sparsely settled territories until it is economical to install transmission lines. One phase of the subject was presented at the recent A.S.M.E. meeting in Kansas City and discussed pro and con, manufacturers, utility representatives and consulting engineers participating. Existing uses by utilities were brought out and attention called to the fact that the size of units is increasing and the cost per kilowatt decreasing.

S. A. Hadley, McIntosh & Seymour Corporation, said in part:

"More study should be made of the possibilities for reducing the cost of current when distributed to the point of use by the employment of Diesel engines of moderate capacity—that is, from 300 hp. to 2,000 hp—installed in suitably located outlying substations and operated regularly over peak-load periods. In this way they would serve the double purpose of peak-load equipment and standby or emergency equipment. Installation costs would be reasonably low, even though the station capacity is relatively small, because such installations would almost invariably consist of single units which permit the lowest installed cost per kilowatt capacity. Their operating costs would be low, because they would be run only with a fairly good load and would have low attendance charges.

"In a community of moderate size, say from 1,500 to 2,500 population, in the Middle West, served by a transmission line from a large central station, one employee would usually be maintained to look after the distribution system and substation equipment, and this employee could, with little extra cost, be one capable of starting and stopping a Diesel engine for these daily runs, so that the labor charge for the generation of this peak-load current would be practically nothing. In larger communities, supplied under the same general system and requiring a larger Diesel installation for their emergency and peak-load needs, conditions would still permit the operation of the Diesel plant with small additional labor expense. There is usually a storehouse and shop as well as a substation, and if combined with the Diesel-engine station this will help to reduce attendance and overhead charges.

"The field contemplated for such installation is the typical Middle Western community of from 1,000 to 5,000 population without any large manufacturing or industrial load, having a general use of from 400 to 500 kw.-hr. annually per inhabitant and served by an interconnected transmission system. In these systems the cost of base-load current, including fixed charges of the generating equipment, is about 1 cent per kilowatt-hour.

"The addition of Diesel engines to substations in outlying communities for carrying peak loads as well as for emergency and standby service would give these results:

"The transmission system, including transformers, could be smaller and cheaper than for serving the communities without the Diesel-engine peak-load station. The main central-station plant could be smaller and could be designed as a true base-load station, thus giving the utmost efficiency possible.

"For each outlying Diesel peak-load station with, say, a single 500-kw. unit, the central-station-plant capacity could be decreased 625 kw., but it might not be deemed desirable and safe to cut off this capacity entirely. However, it would be reasonable to allow some reduction in both central-station capacity and line capacity on account of this outlying peak-load station. It might reasonably be expected that there could be a reduction of 400 kw. in station capacity amounting to $32,000 and a reduction of 400 kva. in line capacity amounting on a 30-mile, 33,000-volt line, including transformers, to about $8,000.

"The cost of the installation of a 500-kw. Diesel peak-load station unit will be approximately as shown in Table I.

"For this intermittent service it is not necessary to have quite the same auxiliaries as would be installed in a base-load plant. The cooling system can have a little less reserve capacity, and since during the period of shutdown the contained water will return to a temperature approximating the atmosphere, it would be an advantage to have a fairly large collecting basin under the cool-

Table I—Cost of Installing 500-Kw. Diesel Peak-Load Station Unit

(Hadley)

750-hp. modern-type Diesel unit, with lubricating system complete, fuel tank, heater and strainer, exhaust muffler, tools, spare parts and anchor bolts, freight, and services of an erecting man	$40,000
500-kw. generator and exciter delivered with engine	4,500
Switchboard control panel, with automatic voltage regulator and connecting cables and conduit	1,300
Piping for fuel, lubrication, starting air, cooling water, and exhaust	600
Fuel storage, 30,000 gal. with transfer pump	850
Labor for unloading, cleaning and assembling equipment ready for operation	800
Cooling tower, with basin and cooling-water pumps	950
Building of plain brick construction, fireproof, with glazed interior wall surface, including both building and machinery foundations, also I-beam with chain hoist and trolley over center line of unit	4,500
Plans, engineering, and general supervision of construction	4,000
Total installation cost	$53,600
Interest during construction	550
Grand total	$54,150
Grand total per kilowatt	$108

ing tower, with a large storage of water, which would relieve the circulating pumps of much work.

"The production cost for such a Diesel peak-load station will be as follows:

	Kw.-hr.
100 summer days, twelve-hour average 200 kw	240,000
100 spring and fall days, eight-hour average 250 kw	200,000
100 winter days, six-hour average 300 kw	288,000
Assumed yearly output	728,000
Fuel rate at average load, lb. per b.hp.-hr.	0.45
Generator efficiency, per cent	92.5
Weight of fuel per gallon, lb	7.5
Miscellaneous losses, per cent	5
Fuel, 66,400 gal. at 4¼ cents	$2,985
Lubrication for 2,960 engine-hours, 740 gal. at average of 60 cents	445
Maintenance and upkeep of the unit, taken at $1.50 per horsepower per year in view of service conditions	1,125
Waste, grease, and miscellaneous supplies	150
Attendance, half time of one man for 3,500 hours per year	1,050
Total production cost, not including fixed charges, management expense, or local distribution	$5,755

"If this idea is fully carried out, the main station becomes a purely base-load station, with its efficiency very greatly improved and the liability of outages greatly decreased, both of the station and the transmission system, due to the absence of daily peaks which are usually carried in part on the overload capacity of the system. The line and transformer losses are cut down considerably, and their reliability is also increased, for the same reasons. The customers in the community where the Diesel peak-load station is situated obtain better-maintained voltage and greatly reduced interruptions to service, and also there is a feeling of much greater satisfaction, due to their knowledge that they have a plant running in their own community. Even though the plant is shut down every day during light-load periods, its presence, with its daily operation, creates a good feeling that seldom exists in a community served entirely from a distance."

Small space occupied

C. E. Beck, Busch-Sulzer Brothers Diesel Engine Company, declared:

"Space occupied by the Diesel unit itself is small and has been greatly reduced in the last two years. It is now possible to install a 2,100-kw. unit in a space 55 x 20 ft. with headroom of 22 ft. Auxiliaries are all small and can be tucked away without difficulty. The future holds forth the probability of 5,000, 7,500 and 10,000-kw. units having surprisingly small space requirements and, with that having been accomplished, still larger units will be at hand.

"The small quantity of jacket water required by the peak-load Diesel is another of its advantages. A 2,000-kw. unit, giving the water a temperature rise of 40 deg. through the engine jacket, will require the circulation of but 450 gal. per minute. Roof space is nearly always available for the conventional cypress or redwood cooling tower.

"Considering the fact that the Diesel engine is a complete power plant in itself, it requires very little attention as compared with a complete steam plant of equal capacity."

Including the same items as Mr. Hadley did in Table I, Mr. Beck showed the cost of a 2,100-kw. unit to be $84.83 per kilowatt installed excluding land.

Continuing, he pointed out:

"It is only a matter of time until the full automatic, large Diesel will be available. When it is, the peak-load Diesel located at some distant point may be started by a load dispatcher. With an interruption in service, to a distant community, the Diesel will start automatically and take the load.

"With the Diesel standing idle a part of the time as a peak-load unit in central stations, outlying communities, hydro-electric plants, etc., it has another application. The engine can be so constructed that it may be quickly uncoupled from the generator, which, in turn, may be operated as a synchronous condenser for power-factor correction. When it is in service it is also of great assistance in voltage regulation.

"The Diesel as a peak-load unit serves very well in hydro-electric plants where the hydro plant reaches the full extent of its water supply. This Diesel will take all peaks and assist in times of low water, such as we are experiencing in many localities at this time. Many installations of this nature are now in operation. In Europe another application of the peak-load unit in the hydro plant has been found. With its inherent high economy and no extra labor cost, the Diesel is operated during off-peak periods to pump water back into the head bay of the plant. This naturally permits the hydro units to operate either at a higher load during the peak period or over a long period. The effect is that investment in more hydro units or more Diesels is delayed and a much better plant load factor is attained.

Peak-load applications exist up to 22,500 hp.

"Soon eastern Colorado will have a 2,000-kw. unit operation as a peak-load machine to assist a steam-turbine plant. Western Nebraska is served by a large utility company which has more than 16,000 hp. in Diesels, several of which are peak-load units and two of 1,000-kw. capacity which are now being installed. The utility serving Sioux City, Iowa, and the surrounding group of towns now has fourteen Diesels in outlying communities taking the peak off the base load of the steam central station at Sioux City. The 15,000-hp. Diesel in the Neuhof plant of the Hamburg Electric Company, Hamburg, Germany, assists a large steam-turbine central station on peak-load service and has been in operation more than four years. At Henningsdorf, Germany, are two 11,700-hp. units doing a similar service. The electric utility at Copenhagen, Denmark, will soon install a 22,500-hp. Diesel, which is now on order, and while reports do not indicate what the exact service will be, it is presumed that this unit will serve as a peak-load machine."

Prof. P. H. Schweitzer reminded the audience that obsolete steam equipment and not new equipment is usually delegated to peak-load service by electric light and power companies, but pointed out that such obsolete equipment is not always located at vulnerable points on a system, such as Mr. Hadley proposes to strengthen with Diesel units. Professor Schweitzer also called attention to the fact that steam stations usually operate around 25-30 per cent capacity factor, and that cutting off the peaks with Diesel engines may increase the capacity factor and thereby reduce the unit operating costs sufficiently to pay for Diesel peak-load units.

Discounts some advantages but admits others

One utility viewpoint was expressed by E. L. McDonald, Kansas City Power & Light, who said:

"From the standpoint of 'reserve capacity,' the installation of a 1,000-hp. Diesel engine on the end of a

transmission line served by a 100,000-kw. station would only be 'a drop in the bucket.' In fact, five or six such installations would mean very little as 'reserve capacity' for the modern central station system does not operate within that margin of reserve capacity, and reserve capacity is best installed within the central station.

"From a standpoint of reducing line capacity, the same will ordinarily hold true, for seldom does a high line contain just enough capacity for the community load. The prospect of new business and the actual 'connected' load demands reserve capacity.

"The main factor in favor of a Diesel engine installation at the end of a central station high line might be, added protection against interruptions. But with the interwoven network of feeders and high lines, it is usually possible to back-feed through a secondary source when the primary source is out of service.

"As the central-station system decreases in size, the Diesel engine becomes more attractive and in the smaller systems, serving a scattered number of small communities or towns, it plays an important part, not only as a peak-load unit, but often as a base-load unit as well.

"The Diesel engine has frequently served as a 'temporary' peak-load unit on a central-station system when the future load and advisability of additional transmission line capacity was questionable. It has served well in this capacity in connection with some of the boom towns of the Texas and Oklahoma oil fields."

Another operating viewpoint was expressed by T. A. Burdick, Alcoa Products, Inc., who said:

"Savings in investment cost by reduction in load on the transmission lines as a result of multiple points of production are not likely to be important or even appreciable in the situation discussed. Also, load increase in towns served from a transmission system are easily taken care of by the simple process of changing transmission transformers, and, if occasion demands, the raising of the voltage.

"It is not reasonable that the generating capacity of a system can be split up into one fair-sized plant and several small ones and the cost of installation remain the same.

"Reduction in generating capacity by virtue of reduction in transmission losses with the proposed system is not to be expected. The total kilowatt demand of transmission losses will likely be under 5 per cent of system demand and investments are not cut on such a fine scale that a 475-hp. engine, for instance, would be installed instead of a 500-hp. unit on account of this difference in demand.

"As far as reliability is concerned, the standard of design and construction for peak-load capacity cannot be logically any lower than that of the balance of the generating capacity. This precludes any theoretical saving in investment cost by virtue of a lower standard for the peak-load plants.

"If it has been found necessary and desirable in well-managed generating plants to have trained and highly responsible personnel and to have operating and maintenance routine carefully planned and carried out, it is hardly consistent to suppose that a system can be operated successfully partly on this standard and partly on a lower one.

"More man-hours per kilowatt of capacity or per kilowatt-hour produced are required in the small plant than they are in a large one. It follows that generating labor will be considerably larger in the case of a number of scattered small plants than it will be with the same load handled by one or two large plants. Furthermore, it would require a marvelously efficient communication and dispatching system between plants in order to utilize the generating capacity of a number of scattered plants delivering energy into a common system.

"Under the plan advanced in which peak load is carried by single-unit plants it is conceivable that a new peak-load plant would have to be built every year in order to keep pace with the growth. Eventually there might be nearly as many peak-load plants as there are towns served, and by that time many of those plants would be unable to take care of the local peak in the town in which they are operated and consequently they would have little value in an emergency. Furthermore, the tendency to multiply the number of generating units as a system grows and develops is working against the principle of simplicity and flexibility desired.

"Any one who has operated systems will appreciate the difficulty of picking up a load which is supported by widely scattered generating units, no one of which is capable of carrying the entire burden even momentarily."

B. J. George, Kansas City Power & Light Company, admitted that in territories in which electric service is not available from transmission lines and in which the present revenue does not justify the extension of transmission lines to the territory the utility might find it economical to install oil engine units of the size to take care of the immediate future developments; then, as the territory develops, supplement the oil engine units with transmission lines, allowing the oil engine to take the peak load and to act as a standby unit. Later, as the community develops to justify the installation of a two-circuit transmission line, the oil engine can be used as reserve capacity or removed from service and installed in another community where the need is greater. The oil engine, with its inherent advantages of readiness to serve, its low standby expense and its portability, is particularly adapted to this plan of development.

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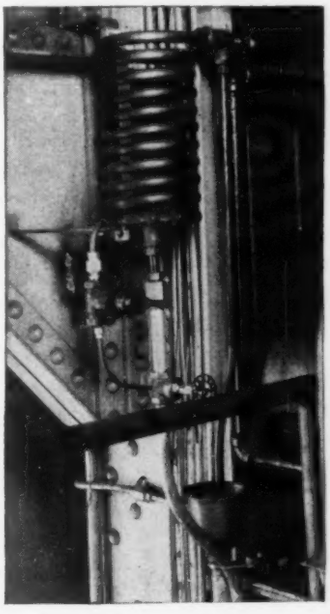
Cool Enough to Handle



Routine sampling of boiler water for regular check-up of chemical content may be a ticklish job for the sampler who tries to catch a bottle of water from a valve connected directly to a boiler drum. A scheme to avoid this difficulty has been applied to one of the boilers in Delray power house No. 3 of the Detroit Edison Company. It is simple and consists merely of a coil with the sampling valve at the end. The water, standing in the coil, has time to cool before it is drawn off.

Anti-Utility Merchandising Legislation vs. Industry Co-operation*

By MARSHALL E. SAMPSELL
Vice-President National Electric Light Association

Every agency for the distribution of electric appliances is needed. Squabbling over the market does not develop it.

FOR the past several years there has been a growing tendency on the part of certain elements both within and outside the electrical industry to resent the fact that central stations are merchandising and installing electric utilization equipment in the homes and places of business of their customers. These people contend that the primary and only business of the central stations is, and should be, to generate and distribute electrical energy. Frequent appeals have been made by those, so contending, to the courts and more recently to the various state legislatures for decisions and laws prohibiting light and power companies from conducting merchandising operations. The majority of the light and power companies, however, take the view that the companies owe a duty to their customers beyond the mere furnishing of electric energy. They maintain that the quality of electric service includes satisfactory operation of the appliances their customers desire to use in their homes.

This viewpoint cannot be lightly cast aside without endangering existing friendly relations between the companies and their customers, and perhaps the loss of customers from their lines. It therefore follows that, while central stations may not have planned to merchandise electrical appliances when originally organized to do a light and power business, they have been forced into the merchandising business in order to protect and properly to develop their electricity supply operations.

Utilities are often the only merchandisers

It should also be borne in mind that in many of the smaller communities now enjoying electric service throughout the country there exist no local dealers at all, and in others those seemingly ready to furnish electrical appliances have not furnished equipment of satisfactory price or quality standards. Under such circumstances the central stations have had no alternative but to supply their electric customers with suitable equipment, since the primary motive of the light and power companies is to render complete electric service, which must include appliances of proved character at fair cost to the consumer.

It is a strange phase of human psychology that business men who consider that government should confine itself to the field for which it was established, and leave to them the field of private initiative and enterprise, should appeal to government for relief, by court or legislative action, from what they consider unfair business practices on the part of the light and power companies, whose only motive for being in the merchandising business unquestionably grows out of the necessity they feel themselves under to afford the public adequate and reliable electric service at fair rates, together with such service facilities as are needed to insure continued proper performance of appliances in use in the customers' premises.

There seemingly exists a general misconception of the actual proportion of merchandising done by electric supply companies. As a matter of fact the electric utility companies did only approximately 30 per cent of the aggregate sales of electrical appliances installed in the homes of this country in 1930, of which total water heaters, ranges and refrigerators account for a substantial part. It would seem, when we keep in mind that in many small towns and on farms the central-station companies provide the only dependable facility in connection with electrical appliances and their servicing, that 30 per cent

**Portion of address before joint meeting of Southwest Power Conference and Kansas City Chamber of Commerce.*

of the total merchandising of electric appliances is not very good proof that the light and power companies have either the desire or intention to monopolize the merchandising business.

The question and the answer

The question is: Can these differences between light and power companies and other merchandising outlets be adjusted finally and with justice to all involved, including the public, which, after all, is the most concerned, by the passage of prohibitory laws? Will such a course bring about complete and satisfactory business relief, without injuriously affecting the public, and eventually doing irreparable damage to others engaged in business endeavors in the community? If so, it will be the first time legislation of this character ever cured a similar economic business situation.

The answer is co-operative effort. At a conference held on June 9 last in Atlantic City the electrical merchandising joint committee accepted a statement of merchandising procedure submitted by the utility representatives of the committee. This statement recommended that electric utility companies take the initiative in bringing about conferences with dealers in their localities to the end that a mutually acceptable procedure be recognized, adopted and put into use for the purpose of stimulating the sale of suitable electric appliances and promoting the use of electric service in a way that will be mutually advantageous to the consuming public, the utility, the appliance manufacturer and all merchandising outlets.

This statement of merchandising procedure evidences clearly a desire for mutual understanding of the problems involved in merchandising electric appliances and, if lived up to, will rapidly do away with past misunderstandings and bring into practice merchandising activities that will be generally accepted by all agencies dealing in the promotion and sale of electric appliances. This should result in the business going to those who seek it on an equitable basis and are equipped promptly to supply electric customers with the right kind of merchandise at satisfactory prices. This will result in increasing sales of electric appliances by dealers; will open up a profitable field for merchandising business, and be a benefit to consumers of electrical energy and electric supply companies.

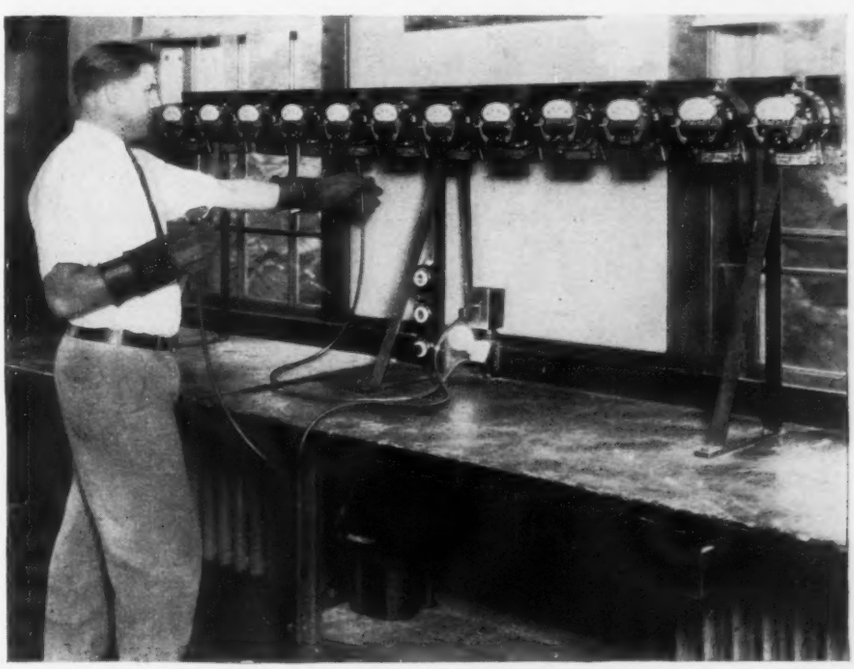
After all, we know that co-operative effort is essential to the successful development of every undertaking. If all groups of merchandisers think and act together in honest, unselfish co-operative effort it will greatly profit the millions of people who rightly look to us for the highest character of electric service on the most advantageous terms and conditions. If each interested group, thinking only of its individual seeming immediate profit, determines to go it alone, we cannot expect proper development of the electrical industry.

▼ ▼ ▼

Meter Ground Test Rack

On a rack only 7 ft. 6 in. long carried 24 in. above the workbench by a 1½x¼-in. steel strap frame the Worcester Electric Light Company tests twelve meters per group for grounds between cases, terminals and coils. A test potential of 1,100 volts is obtained from a transformer mounted below the bench, and the transformer is energized by closing a spring-releasing push-button in the 110-volt secondary circuit. A pilot lamp is connected across the secondary wires to indicate when the transformer is alive. The 1,100-volt leads from the transformer are run in conduit behind the bench to a 1-in. x ¼-in. steel strap at the top of the meter-test hanger board, each meter-supporting bolt thus being connected to one side of the high-voltage winding. The other 1,100-volt terminal is brought to a jack box at the rear of the bench. In testing, a heavily insulated jumper with a test terminal at one end is plugged into the jack.

The entire wiring is underground, and the use of rubber gloves in making the test increases the safety factor. The meter-supporting board is a 6½-in.x¾-in. wooden panel, treated with insulating paints, and the rack frame extends only 12 in. from the rear of the bench. Meter supports are 7½ in. apart on centers. The test has cut down many ground troubles arising from long exposure of meters to locations in damp cellars and basements.



Meter test rack mounted to leave bench free for miscellaneous work

Mechanical Features Differ

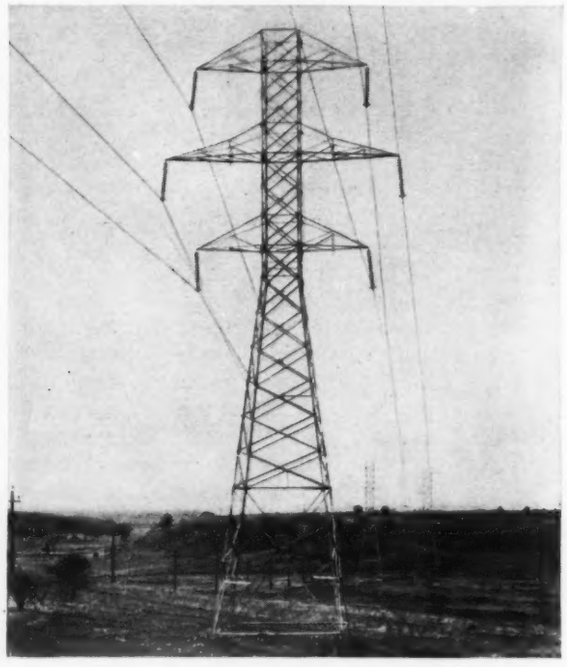
By E. M. WRIGHT

Assistant Engineer Pacific Gas & Electric Company, San Francisco, Calif.

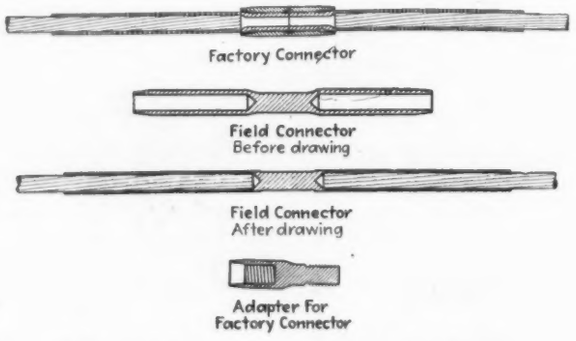
TRANSMISSION lines have been operating at 220 kv. for nearly ten years and design and construction have become largely standardized. Nevertheless, each new line has some features that differ from previous practice. The recently constructed 220-kv. line from the Mokelumne River hydro-electric development of the Pacific Gas & Electric Company does not depart from standard construction to any great extent, but a few of the details of design and the application of some of the common methods of construction should be of interest to transmission engineers.

The line consists of two circuits between Tiger Creek power house and Newark substation on San Francisco Bay, a distance of 109 miles. The line will carry a peak load in excess of 150,000 kw. and traverses a course which parallels and crosses several 110-kv. lines and one 220-kv. line, so that it may easily be tied in with other circuits on the company's extensive transmission system.

There are two general types of towers in the line, the first section being in the heavy loading area, where standard snow type towers on concrete foundations are used carrying the circuits in flat configuration. In this area the line is designed for ½ in. of ice and a 6-lb. wind pressure at 0 deg. F. Each circuit is on a separate line of towers. The next section is called the medium loading section and is constructed for ¼ in. of ice and a 6-lb. wind at 0 deg. F. The remainder of the line is the light loading section and is designed for an 8-lb. wind at 25 deg. F. without sleet or snow loading. In the medium and light loading area twin-circuit towers are used. These towers are built in three different strengths. Standard straight line towers are allowed an angle up to 6 deg.; a light angle tower allows angles up to 10 deg. and may be dead-ended, and there is a heavy tower which will take heavy angles and dead-ends. All of these towers have concrete pier foundations, that for the light tower being designed so that a 3-ft. diameter hole may be dug by machine where the formation permits.



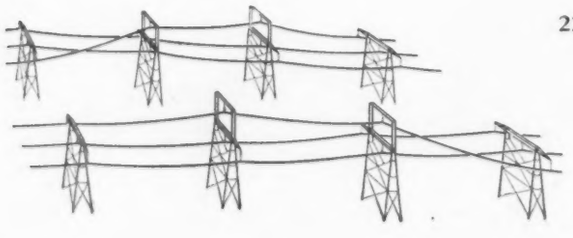
Typical 220-kv. construction in medium loading area with center conductor offset 5 ft.

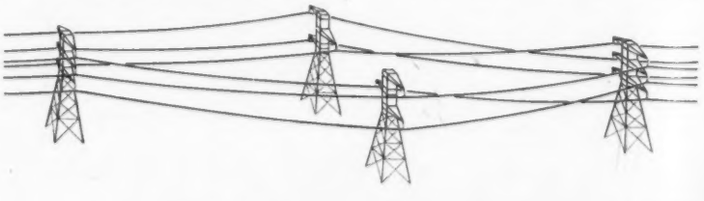


Field and factory connector with adapter

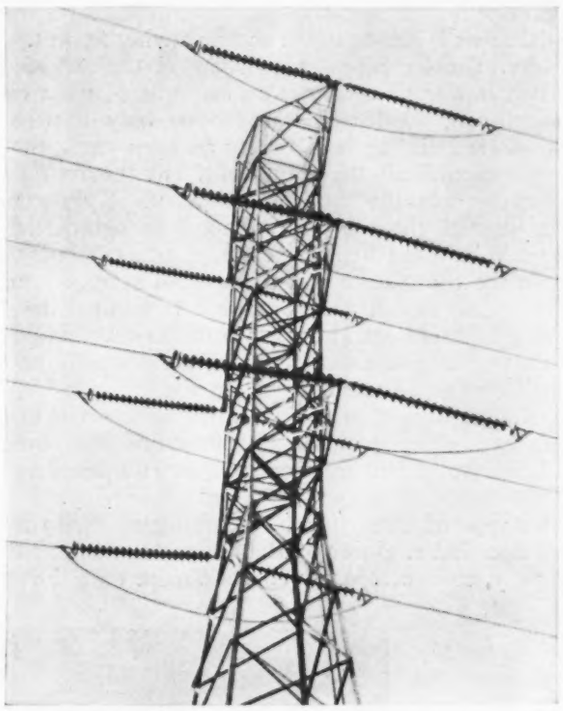
Although the medium and light loading area is still further divided into three general types of towers, the base sections are the same for each type, the cage only being different. In the medium loading area the center conductor is offset outward 5 ft. with a 15-ft. vertical spacing between crossarms. In the light loading area, non-fog section, the conductors maintain the 15-ft.

220-kv. transpositions in snow territory and on twin-circuit towers





on Mokelumne 220-Kv. Line



Dead-end construction in fog area

vertical spacing. In the fog area in the vicinity of San Francisco Bay the conductors are in vertical configuration with 18-ft. spacing in order to allow for increased insulation.

In the heavy and medium loading area, where strength of conductor is important and where the distance is comparatively short, aluminum cable with high-strength steel core is used. This cable is 518,000 circ.mil, of aluminum with steel core approximately $\frac{5}{8}$ in. in diameter, 37 strands of aluminum and nineteen strands of steel cable. Connections are made with the Aluminum Company of America pressed-on aluminum sleeve.

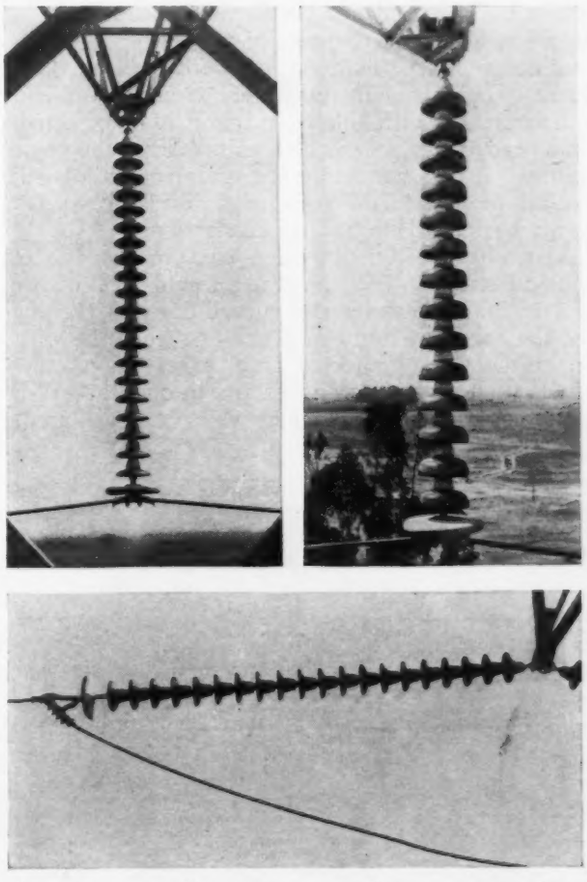
In the light loading and fog area, where strength is not so necessary but conductivity and low corona loss are of primary importance, hollow-core copper conductor was chosen. This copper is 1 in. outside diameter with a twisted copper eye-beam core. The conductor is 500,000 circ.mil with two layers of wire each 0.097 in. in diameter. The size of the cable and the individual wires was determined after extensive corona tests had been made at the Ryan Laboratory at Leland Stanford University.

Splices were made in the factory and consist of threaded lugs drawn on each end of each wire. A sleeve nut is secured between these two threaded lugs in the field, thus completing the splice. The entire joint is very similar to a pipe union and on account of right- and left-hand threads the connection can be completed in the field without the necessity of twisting the conductor on either side of the joint. In case two right-hand or two left-hand threaded connectors come together in the field, so that right-hand-left-hand threaded factory connector cannot be used, an adapter to reverse the threads on one end of the conductor is used. The accompanying drawing shows this adapter and the several types of connectors used. Where necessary to make a field splice due to damage to the conductor, the same lugs or a single-piece sleeve may be drawn on in the field with a portable machine which is very similar to that used in the factory.

All hardware on both the aluminum and copper cable is of the bolted type, particular attention being paid to the close fit of the conductor.

Hardware for the copper conductor was especially designed so that the clamp would exactly fit the conductor for not less than 80 per cent of its circumference. By using this type of dead-end clamp the necessity for cutting the conductor was eliminated. A suspension clamp with two U-bolts was used at important crossings to prevent the conductor from slipping in case of failure in the adjacent spans.

While the use of dead-end clamps of this type is rather



Several types of insulator assemblies were used in fog area to determine relative values

Physical Data on 220-Kv. Mokelumne Line

Length	Towers	Conductor	Units, Suspension	Units, Dead-end Hi-Strength
15	Single-circuit, snow type	518,000 circ.mil A.C.S.R.	13	13
11	Twin-circuit, sleet type.	518,000 circ.mil A.C.S.R.	13	13
53	Twin circuit.....	500,000 circ.mil hollow-core copper	13	13
6	Twin circuit.....	500,000 circ.mil hollow-core copper	No. 1 cir. 12 units fog type	17
			No. 2 cir. 17 standard units	17
5	Twin circuit.....	500,000 circ.mil hollow-core copper	No. 1 cir. 11 units fog type	17
			No. 2 cir. 17 standard units	17
8	Twin circuit.....	500,000 circ.mil hollow-core copper	No. 1 cir. 13 units fog type	20
			No. 2 cir. 20 standard units	20
10	Twin circuit.....	500,000 circ.mil hollow-core copper	No. 1 cir. 14 units fog type	20
			No. 2 cir. 20 standard units	20

unusual on both aluminum and hollow-core copper, the lower tension used and the success with which the same type of clamp had been used on the aluminum for the Pit River 220-kv. lines seemed to justify its use and resultant economy of construction for the Mokelumne line.

Some experimental value is expected from several different types of insulation in the fog area. In this section the standard units were used throughout on one circuit, while fog type units of two different types and four different lengths of string were used on the other circuit. High-strength units were used in dead-ends on both circuits. With this comparison it is expected that some practical value will be obtained from the record of failures on the various types and lengths of strings. Typical dead-end and suspension insulator strings are shown by the accompanying illustrations.

A corona shield is installed next to the line on all insulator strings. This shield is a round sheet of pressed steel 16 in. in diameter and curved down at the edge so that the hardware and connections between the wire and the insulator are protected from excessive corona loss. Observation of strings on test and in operation show no visible corona at the voltage at which they are used.

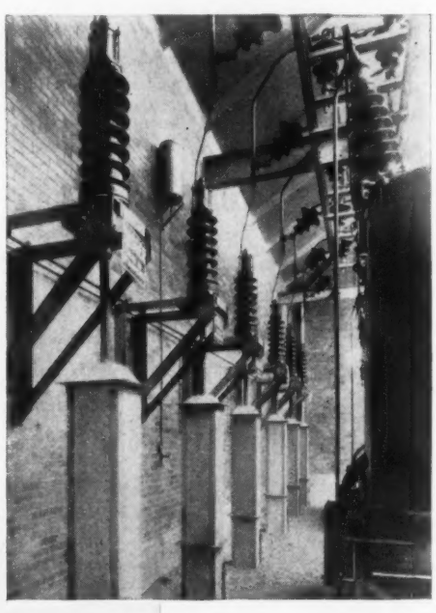
Attractive Outdoor Substation for Residential Area

One of the interesting ideas developed by engineers of the American Gas & Electric Company for improving the appearance of outdoor-type substation structures in residential areas is shown in the accompanying figures. This 44/4-kv. Brooks Street substation of the Appalachian Electric Power Company is an example of what can be accomplished. What appears to be only a neat and unobtrusive building is in reality an open yard; the wall extends around all the equipment, but the roof covers completely only the control equipment. This arrangement permits the use of outdoor-type equipment and assures minimized building costs, good neighborly feelings in the community and unimpaired service values.

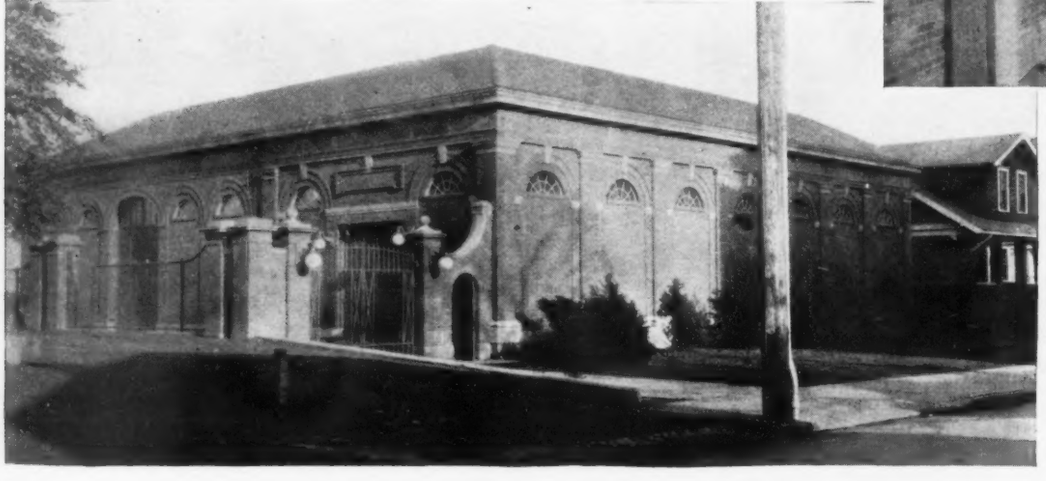
Metal-clad switch gear was used to control the 4-kv. circuits. Station entrances for both the 4-kv. and 44-kv. lines have been made underground. The pole in the foreground carries communication circuits.

A similar design, erected in a manufacturing district, simulates a three-story factory structure with windows and brick walls, but here too outdoor equipment is used and the walled-in space is left open.

This type of construction, according to Philip Sporn, chief electrical engineer of the American Gas & Electric Company, costs comparatively little more than the standard type of construction where the high-tension equipment is placed entirely outdoors and the low-tension equipment is housed in a building harmonizing with the surrounding architecture.



This wall conceals an outdoor type switch yard



A Point of View on the N.E.L.A. Convention Exhibit

By PRESTON S. ARKWRIGHT
President Georgia Power Company
Past-President National Electric Light Association

NATURALLY I have read with keen interest the recent editorials in ELECTRICAL WORLD on the value of the N.E.L.A. convention exhibits and have listened to considerable discussion. My opinion, so often expressed when I was president of the association, remains unchanged. I regard the exhibition as of more value than the business sessions at the convention. In the president's address at the convention in 1929 I stated that if a person couldn't find the opportunity to attend both the exhibition and the business sessions, then he ought by all means to attend the exhibition, even if he had to cut out the business sessions. I still think so.

In short, there is no question in my mind as to whether or not an exhibit should be held at future conventions. Of course it should. I will readily agree, however, that whatever can be done to realize a fuller value out of the exhibition next year and in future years certainly ought to be done. That a greater return can be obtained, I do not doubt. This great exhibition of electrical equipment and appliances has grown to its present proportions by a natural process of evolution, along with the growth of the industry. As the size of the power industry has increased, so has the number of electrical manufacturers, and naturally larger conventions have attracted a larger attendance by manufacturers' representatives and more manufacturers have desired to exhibit their products.

Year by year the exhibit has reflected the trend of interest in apparatus and appliances. Last year's show was as different from the displays of fifteen years ago as the current problems of the industry are different. But this fact remains true, that power company men are still intensely concerned with manufactured products and manufacturers are still vitally interested in the needs of their customers. It is natural, therefore, that these products should continue to be displayed at the convention. It is as logical here as in the exhibit at the convention in any other industry. It is done as a matter of course. I believe also that it is taken largely as a matter of course by the power company men. And I doubt very much if either the utility men or the manufacturers are doing all they can and should to make the most of this convention exhibit.

I have said that I regard the exhibition as of more value than the business sessions at the convention. Let me explain. It is a broad statement and I do not want it to be construed as questioning the worth of the business sessions. I believe in these conventions. They are worth far more than the time and money that are spent on them. This is a very large industry. The men who direct and operate the light and power service companies of the country are scattered all over this broad land. They are struggling with the same problems, yet because each man's work is restricted to his own locality they have little chance to get together and exchange experiences and support each others' confidence. The N.E.L.A. convention provides such an opportunity. The variety of contacts they make there is worth a great deal to the industry and to the public it serves. The business sessions bring information and inspiration to individuals that are not found in the home town. It is all worth while.

But there is something more to it than the exchange of opinion and experience that come from contacts and the ideas that come from meetings. This business of ours has to do with things as well as ideas. We are operating power systems in which we are dependent for our production and our costs upon engineering equipment. And we are dependent for our load and revenue upon the current-consuming apparatus and appliances that our customers use.

Exhibit is educational opportunity

The most important ideas that we can bring home from a convention are new ideas on manufactured products. It is of inestimable value to us, therefore, if we can see at the convention the greatest possible display of equipment and appliances, so that our engineers, our sales managers and our executives can study the progress of the art since the last year and find out what new things there are that we can use on our lines to redluce our costs and that we can introduce to our customers to improve our load factor and earnings. We see things that are not brought to our offices for us to look at. We see them under conditions where we can make comparisons. We can look them over together and exchange opinions on them. There is no other such opportunity. And if we take an intelligent advantage of it, that alone is worth many times the cost of the trip to each one of us. That's why I say that the exhibit is worth more than the business sessions. It is the most valuable educational opportunity at the convention.

It is a fact that the operating companies were not very liberal in sending representatives to the last convention. I am told that there were 8,800 people registered, but I don't know where they came from, for I do know that the operating companies did hold down pretty closely the number of people they authorized to attend the convention. I don't know how we are going to help this, because if business doesn't pick up very considerably, we will still be economizing next year on convention attendance as well as everything else. Certainly, then, those who do attend the convention ought to be urged to visit the exhibits and be given an opportunity to do so.

But something more than an opportunity is necessary

if we are to capitalize this exhibition to the utmost. I feel that it should be much more highly organized than in the past. Two suggestions that have been made, I believe, might well be followed out: First, exhibitors themselves, by better showmanship, can emphasize the educational features of the display and make it easier for the visitor to group the new ideas it presents and understand their application; second, a place may be made in the official program of the convention for the study of the exhibit, so that it will be easier for every delegate to find the time to spend a half day in the exhibition hall. With this arranged, every power company should be urged to send to the convention those engineers and commercial men who are best fitted to study the exhibit from both the operating and load-building angles. It should be made a major purpose of the trip, and these men should be directed to report on their study of the exhibit, and follow through by securing samples of equipment and appliances that seemed to them to offer possibilities so that they may be examined, discussed and tested on the ground.

It seems to me that such an attitude toward the convention exhibit is only common sense. It is particularly so right now, when economy is of such general concern. A broad study of equipment and appliances, only possible in a vast display of this kind, where the products of so many manufacturers may be compared, suggests opportunities for improvement in engineering and sales work that will not be discussed otherwise. A man who goes to the convention with this purpose uppermost in his mind will pay many times the cost of his trip in the savings that will result. But after all, the comparatively small expense is not the controlling factor. The volume of our business justifies it. But it also demands that we make a more serious effort to organize this exhibition into our convention week so that it is not neglected.

▼

Automatic Live Line Selection

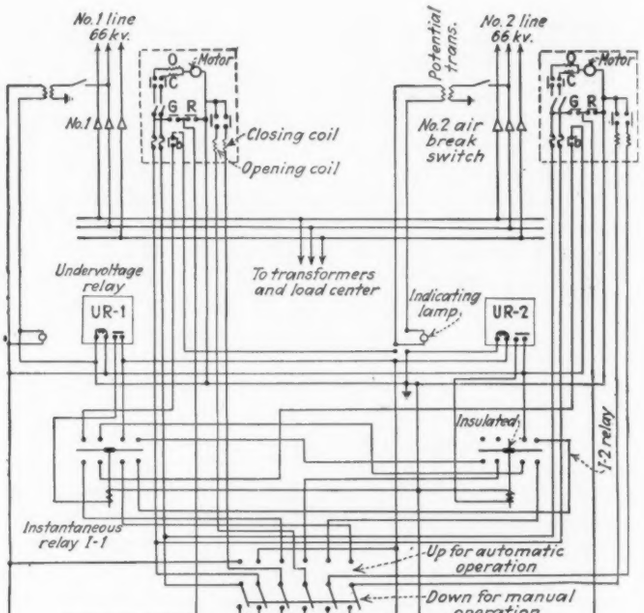
By C. W. JONES

New England Power Engineering & Service Corporation, Boston, Mass.

The following relaying scheme was developed automatically to select the live line under conditions where a substation is tapped off two transmission lines through motor-operated air-break switches. Under normal operating conditions, that air-break switch is closed and the other open. If the line which has its air-break switch closed becomes de-energized, and provided the other line is alive, the air-break switch opens and the other one closes. This condition exists as long as the line remains alive, if the line becomes de-energized and provided the first line has become energized again, the air-break switch on the dead line opens and the one on the live line closes. This sequence is repeated each time the line having its air-break switch closed becomes de-energizd. The detailed sequence of operation is as follows:

Referring to the diagram and assuming a normal operating condition with No. 1 air-break switch closed and No. 2 open and both lines alive: If No. 1 line becomes de-energized, the undervoltage relay *UR*-1 on that line becomes de-energized, closing its contacts and energizing the instantaneous relay *I*-1 on No. 1 line. The *I*-1 relay closes its two sets of upper contacts, one of which opens No. 1 air-break switch through interlocking contacts on the *I*-2 relay, which is de-energized and in the down position because No. 2 line is alive, and the other closes No. 2 air-break switch through the interlock switch (*b*) on No. 1 line air-break switch mechanism and through the lower contacts of the *I*-2 relay. The air-break switch on No. 2 line will stay closed as long as the line remains alive regardless of whether No. 1 line becomes energized or not.

In case No. 2 line becomes de-energized and No. 1 line has become alive the undervoltage relay *UR*-2 on No. 2 line closes its contacts, energizing the *I*-2 relay, which closes its upper contacts and opens No. 2 air-break switch through the lower contacts on the *I*-1 relay (which is down because No. 1 line is alive). As soon as No. 2 air-break switch opens, No. 1 air-break closes through the lower contacts of the *I*-1 relay and the interlock switch (*b*) on No. 2 air-break mechanism. This set-up will



Wiring details of relay scheme for automatic live line selection

The circuits also provide for manual operation.

exist until No. 1 line becomes de-energized again, in which case the previous operation will be repeated. The switches are so interlocked that only one switch can be closed at a time, thus preventing the possibility of tying two lines together which may be out of phase.

Energy to operate the motor mechanisms is furnished by a potential transformer on each line. Energy to open No. 1 air-break is furnished by the potential transformer on No. 2 line and power to close No. 1 air-break is furnished by the potential transformer on No. 1 line.

The air-break switches may be made non-automatic and operated from control switches by throwing the six-pole, double-throw switch to down position. Power for manual operation is selected from a live line by the single-pole, single-throw switch. An indicating lamp on each line facilitates selecting an energized line, while control lamps connected to the motor mechanisms indicate the position of the switches.

Minimum Adequate Wiring Specified for Stores*

This specification defines the minimum limits of wiring installations for lighting and other applications of electricity commonly supplied from so-called "lighting" circuits that will provide adequate carrying capacity and reasonably low voltage drop. This specification applies only to installations for connection to 115-volt or 115-230-volt distribution systems and does not apply to wiring for the supply of energy to power equipment. This specification is based upon 15-amp. fusing of branch circuits. If local regulations limit the load on branch circuits to less than 15 amp., the wattage and area limits herein specified should be proportionately reduced. As the requirements given herein are minimum, it is recommended that the installation be increased and elaborated upon in proportion to the design, scale and appointment of the structure.

Convenience Outlets and Circuits Therefor—(a) Convenience outlets shall not be placed on the same circuit with outlets for general illumination. No more than six convenience outlets shall be placed in one circuit (in beauty parlors and similar places, not more than two per circuit) and those located in the wall or baseboard shall be of the duplex type. No wire smaller than No. 12 shall be used for convenience outlet circuits. Runs exceeding 100 ft. from panelboard to the first outlet should be avoided wherever practicable by relocation or addition of panelboards. Where such runs are not avoidable, no wire smaller than †No. 10 shall be used from the panelboard to the first outlet and no wire smaller than No. 12 between outlets.

(b) In stores having supporting columns there shall be installed at least one convenience outlet on or in each of the supporting columns, for decorative lighting, electrically operated equipment or display fixtures. In stores having no supporting columns there shall be installed at least one floor convenience outlet for each 400 sq.ft. or major fraction thereof of floor space, these outlets to be uniformly distributed over the entire area. In any display area no more than six such outlets shall be connected to any one circuit.

(c) Office areas. There shall be a branch circuit to supply convenience outlets for every 800 sq.ft. of floor space or major fraction thereof, to be used for offices. In each separate office room with 400 sq.ft. or less of floor area there shall be installed at least one convenience outlet for each 20 linear feet of wall or major fraction thereof. In each separate office room with more than 400 sq.ft. of floor area there shall be installed at least four convenience outlets for the first 400 sq.ft. of floor area and at least two additional convenience outlets for each additional 400 sq.ft. or major fraction thereof.

NOTE—Outlets should be placed at suitable locations to serve all parts of the office room.

Ceiling Outlets for General Lighting—Whenever possible, outlets should be located on squares. In office areas no two adjacent outlets shall be spaced farther apart than the distance from floor to ceiling. In other interiors the space may be extended to 1½ times the ceiling height. In corridors and storage areas spacing between outlets shall not exceed 20 ft.

Area for Branch Circuits for General Lighting — Except as specified below, there shall be one branch circuit for the general lighting for each 400 sq.ft. or less of store space or rentable area and one branch circuit for general lighting for each 800 sq.ft. of passageway or other non-rentable or non-producing area.

EXCEPTION—For general lighting from other than ceiling outlets, provide one circuit for each 200 sq.ft. of floor area.

Wattage per Branch Circuit for General Lighting—The initial load of any circuit shall not exceed 1,000 watts except in the case of a single lamp of larger size.

Wire Size of Branch Circuits for General Lighting—No wire smaller than No. 12 shall be used in branch circuits. For runs of over 50 ft. from the panelboard to the first outlet no wire smaller than No. 10 shall be used, and no wire smaller than No. 12 between outlets.

Runs exceeding 100 ft. from the panelboard to the first outlet shall be avoided wherever practicable by relocation or addition of panelboards. Where such runs cannot be avoided, the areas specified shall be reduced by 40 per cent, and the initial load on any circuit shall not exceed 600 watts.

Panelboards—Panelboards shall contain a minimum of one spare circuit position for each five circuits or fraction thereof in service.

NOTE—It is recommended, but not required, that each circuit on the panelboards be supplied with a switch in addition to the fuses, or with a circuit breaker, except that individual circuit switches or circuit breakers are not needed for circuits supplying show windows and/or signs controlled by time switches.

Service and Feeders—The current-carrying capacity of the service and feeders shall be great enough to supply 7½ amp. to every 15-amp. branch circuit position provided for on the panelboard or panelboards which they feed, in addition to any power requirements for heavy-duty appliances or other non-lighting equipment which may be supplied through this service and/or feeders. The service and feeders shall be of such size that the total voltage drop from the service entrance to the panelboard will not exceed 1½ per cent with a load equal to the total capacity as stated in the preceding paragraph. Conduits and ducts for inclosing service and feeders shall be of sufficient size to permit replacing the original service and feeders with wires two standard gage sizes larger or 50 per cent greater in capacity. Where conduits or ducts are not used, the original installation should have this excess capacity.

Show Windows—At least one branch circuit shall be provided for each 5 linear feet or major fraction thereof of plate glass, measured horizontally, for general illumination of the window. At least one convenience outlet shall be provided for each 5 linear feet or major fraction thereof of plate glass, measured horizontally, for window spots or floodlights. These convenience outlets shall be on separate circuits with not more than three outlets per circuit. Such circuits shall be controlled independently of those for general illumination of the window. In or near the floor of each window there shall be at least one convenience outlet for each 50 sq.ft. or major fraction thereof of floor or platform area. In no case shall there be less than one for each 10 linear feet of plate glass. No more than six such outlets shall be placed in a circuit. A time switch of proper capacity should be installed in the feeders or sections of panelboard thus supplying show windows. Where no time switch is installed, provision should be made for conveniently installing one at a later date.

Exterior Electric Signs—A rigid metal conduit not smaller than 1 in. trade size or equivalent duct, or where conduit or duct is not used, three No. 6 wires shall be run to the front face of the building, preferably from the panelboard controlling the show window circuits. This panelboard shall have at least four branch circuit positions or equivalent for supplying an electric sign.

Provisions for Showcase Lighting—There shall be one circuit terminating in a pull box for each 40 linear feet or major fraction thereof of actual or probable showcase, and/or wall-case frontage.

NOTE—Where the location of show and/or wall cases has been definitely determined before the wiring is done, and the original wiring layout provides capacities and facilities for show and/or wall-case lighting which are equal to, or in excess of, the minimum provided above, then such wiring will be acceptable.

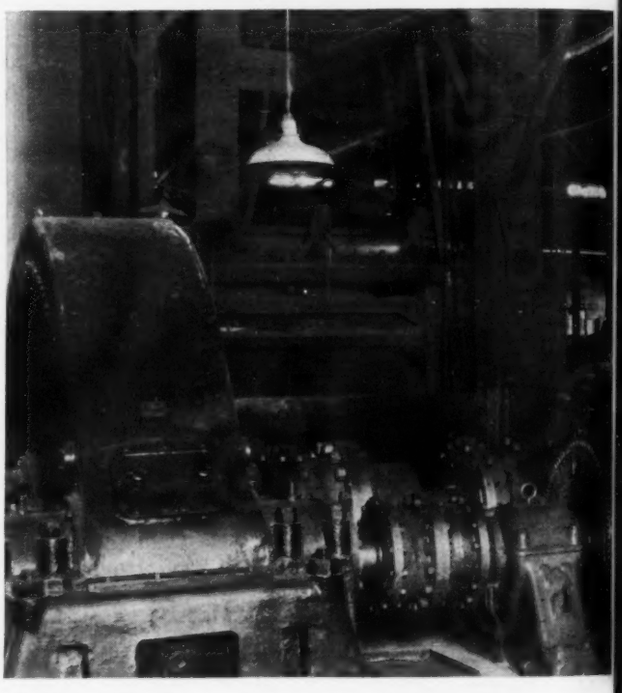
*From a report of the store lighting subcommittee, lighting service committee, Illuminating Engineering Society, at the recent annual convention in Pittsburgh, Pa.

†NOTE—In so far as No. 10 wire cannot be properly connected on the binding screws of the convenience outlet device, it is suggested that No. 12 circuit wire be spliced onto No. 10 for such device connection.

Steel Mill Electrification Reduces Production Costs

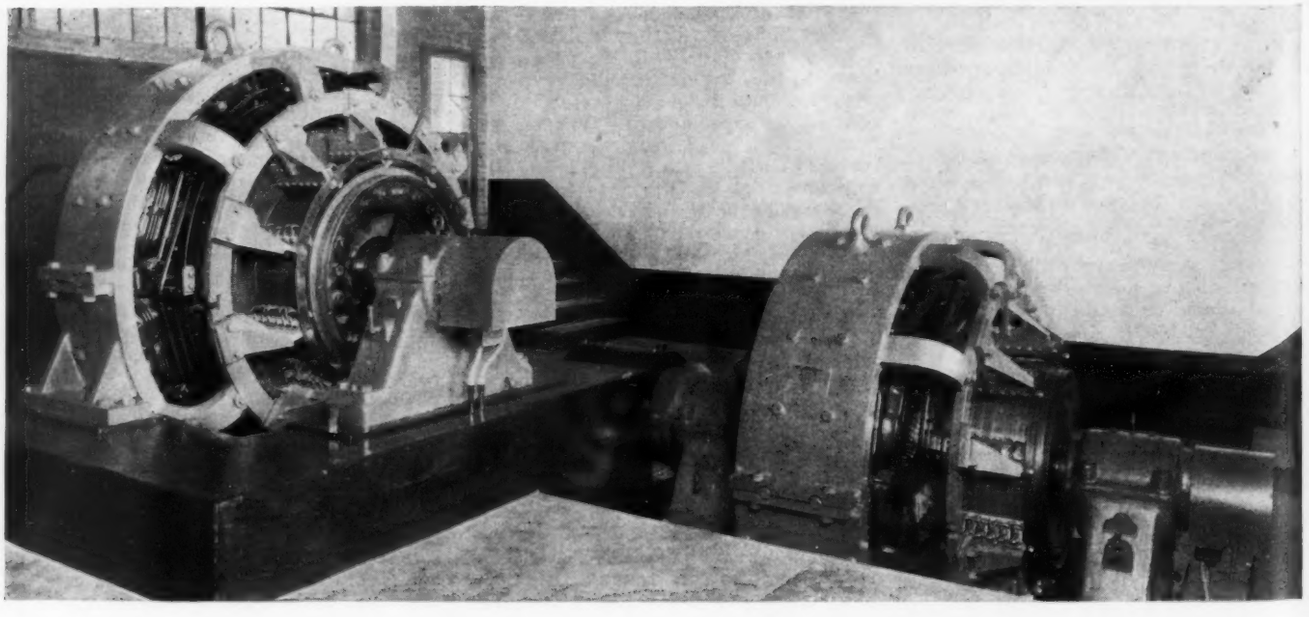
LOWERED costs, resulting from increased production, difference between purchased power and steam expenses, reduction of unit electricity rate due to increased utilization, and decreased attendance and maintenance, were predicted by the Freyn Engineering Company to follow electrification replacing four steam engines and an exhaust steam turbine in the merchant shape mills of the Carpenter Steel Company at Reading, Pa. Although the mills have been in operation only a short time since the electrification was completed, there is every indication that the estimated savings will be more than realized; in fact, the present trying times have demonstrated beyond doubt that the savings made possible by the quick stopping and starting of the mills when lining up or changing size of rolls were very much underestimated. This is clearly shown by a comparison of the earnings of the mill men with a somewhat similar period of operations during the depression of 1921.

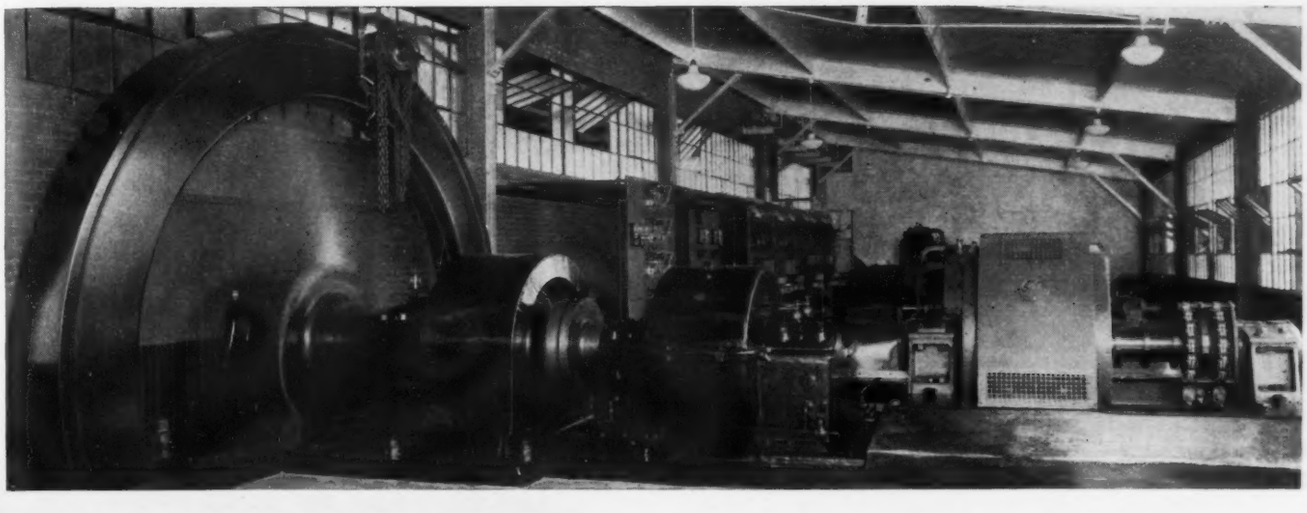
During that period the mill men failed to earn their day rate. It was therefore necessary for the Carpenter Steel Company to make up the difference between that which they earned and the day rate which is guaranteed them; however, since the electrification of the mill, this condition has not existed. The mill men even under the present conditions have made considerably more than their day rate. Furthermore, the tonnage produced so far indicates the selection of the size and speed of the mill motors to be correct, making the electrification an outstanding success.

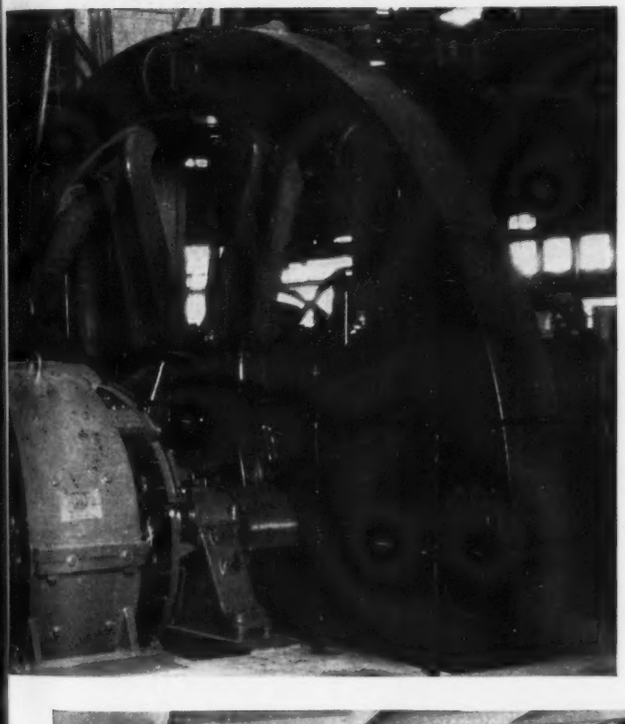


The jackshaft and belts are gone

These two motors, one 750 and the other 1,000 hp., drive 12-in. and 10-in. merchant mills, respectively, that were formerly powered by a steam engine through a jackshaft and belt drive.







Exhaust turbine gives way to induction motor

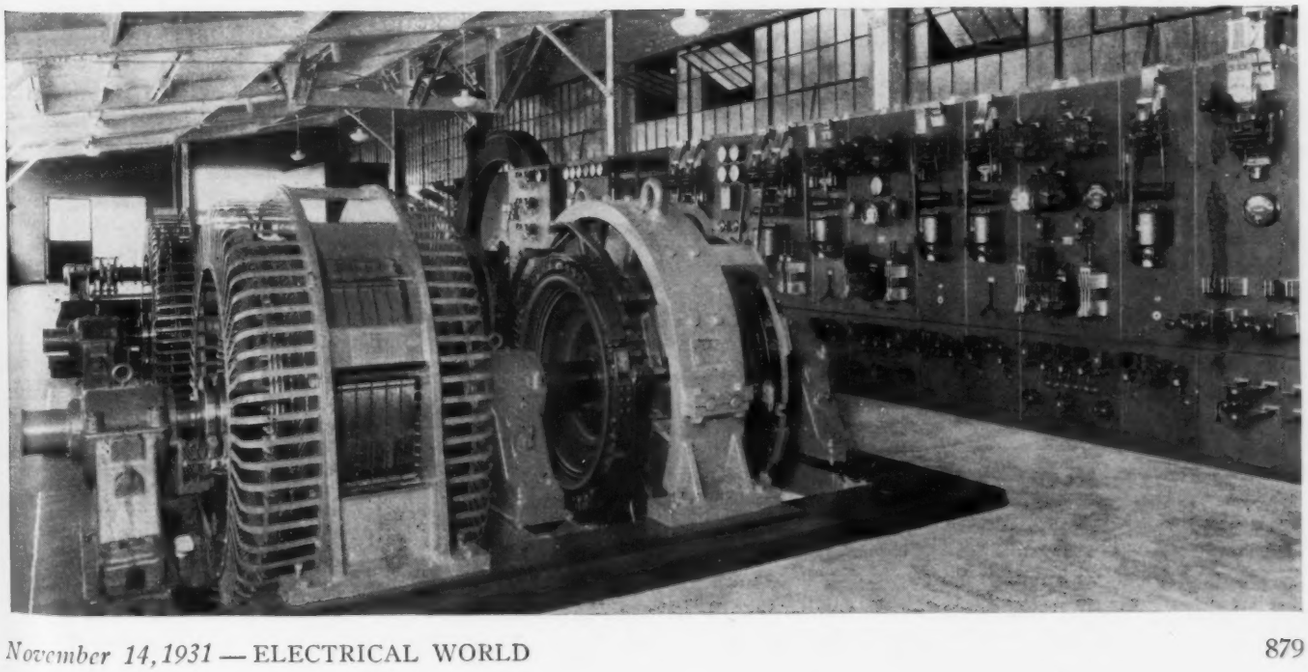
This 600-hp., 600-r.p.m., 2,200-volt induction motor is the only alternating-current drive in the Carpenter mills. Retention of the flywheel and insertion of a permanent resistance in the motor secondary to allow 10 per cent slip permit sufficient speed flexibility for the 18-in. Belgian type roughing mill.

Replacing a steam engine

Utilizing the existing equipment up to and including the engine flywheel the new electric drive of the 16-in. guide mill exhibits a conspicuous decrease of space occupancy over the steam engine it replaces. The motor is direct current, 750 hp., 250 volt, 425/850 r.p.m.

Engine room becomes motor room

The expense of a new building was saved by installing the d.c. conversion equipment, two 1,000-kw. motor-generator sets, in one of the old engine rooms.



Seeking Light Upon Industry Problems*

By Mrs. GLENN L. WHEELER
President New Hampshire League of Women Voters

Service prices of minor importance.
Comparisons necessary between private and government ownership.
Cost information desired by women.

IN DISCUSSING what the forward-looking women of the country want of the electric industry, I take it for granted that what is desired is something more than the average housewife's answer. The viewpoint of the average woman consumer permits a simple and definite answer—low rates, cheaper appliances and good service; good service in the distribution of electrical energy and an improved system and lower cost in the servicing of appliances. There seems to be some cause for complaint in the present arrangement in many places. There is, apparently, a lack of co-operation between the manufacturers, or selling agents, and the operating companies. In reply any man, or group of men, connected with the electric industry would give the answers we have heard many times: that the rates are being lowered as rapidly as possible; that there is constant research and experiment so that efficiency may be increased and cost decreased, and then comes the question by which we have learned to identify a person connected with the industry: "But your bill for electric current is such a small part of your household budget, why worry about the rates?" To be sure, it is a small item compared to the service electricity renders, but no one wants to pay more for a commodity than it is worth. The cost of your tobacco may be a small item of your budget, but I doubt if you would be willing to pay 15 cents for a 10-cent cigar.

Rate bases interest consumers

The study of public utilities by the League of Women Voters comes under its committee on living costs, which was first formed because of interest in the meat-packing industry. From the beginning the committee has emphasized the importance of regulating businesses which control the necessities of life. The study of the regulation of utilities naturally followed. Other items under this committee are the relation between tariff legislation and living costs, elimination of unnecessary costs in producing and distributing necessities of life, development of Muscle Shoals as a national asset, increased appropriations for the Bureau of Home Economics, opposition to efforts to abolish or undermine the Federal Trade Commission, and the activities of the Departments of Agriculture, Commerce and Justice that tend to lower living costs and prevent unfair trade practices.

We, like the average housewife, want low rates, but we have learned that there are many things to be considered in fixing rates, and the study of these has led us into many interesting fields. We have learned that rates must be fair and reasonable from the points of view of two sets of people, the consumer and the investor, and so we come to the important question of the valuation of the property upon which this rate of return is based. Shall the valuation of the property be based on the historical cost or prudent investment theory, or on reproduction cost? Here we find a great divergence of opinion, with the utilities generally following the reproduction cost theory. I wonder if, with the decline of prices, the utilities will still favor this basis?

Then there is the so-called going concern value—good will—and the value of the franchise which grants the utility special privileges. Shall these be considered in fixing the rate base? Are they taxable? We in New Hampshire decided in the last Legislature that the franchise is taxable and now we are interested to know how it is going to work out. Even the sponsors of the bill realized its weaknesses, but it seemed the best we could do under our Constitution to meet the situation caused by the development of such projects as Fifteen-Mile Falls and the export of a vast amount of electrical energy, to say nothing of compensation for the ugliness of the transmission lines that deface the length and breadth of our state.

This brings us to the question of how much do taxes affect rates. Will New Hampshire's franchise tax have the tendency to increase—or delay the reduction of—rates, as was stated in the hearings? It does not seem reasonable to suppose that the two or three hundred thousand dollars, which was the estimated revenue from this tax, would justify an increase in rates for service in an industry with a valuation of more than $31,000,000, which in 1929 produced nearly 600,000,000 kw.-hr., though I understand that certain rate reductions have been postponed until the amount from this tax is determined. We shall watch with equal interest the results of Vermont's new utility tax bill which wipes out the tax on the physical property of the electric utility and imposes a tax on the income. The tax on the kilowatt-hours produced, which is being tried out in a Western state, seems the most reasonable, but it will be some time before it is wise to draw a conclusion.

We find that the question of taxation is of great im-

**From an address before the New England Division, N.E.L.A.*

portance in any discussion of municipal operation or ownership. The relation of taxes to rates was brought to my attention when I inherited a piece of property in Morrisville, Vt. I had been told a great deal about the expenses of the town being met, to a considerable extent, by returns from their municipal electric plant, in spite of the fact that they advertised the cheapest electric rate in the state. I was quite surprised when I received my first tax bill to learn that the tax rate was some $32 or $33 per thousand, which meant that I, the property owner, was paying a good share of my tenant's electric bill. There are, of course, many well-managed municipal plants that are serving their communities well at very low rates, but there are so many things to be taken into consideration, such as taxation, extent of distribution, accurate information as a basis for comparison, that it is difficult to make a satisfactory study of them. It is because of this difficulty that the League of Women Voters felt the need of a yardstick by which we could make a comparison of rates and why we, in 1922, went on record as favoring government operation of Muscle Shoals. This is not to be interpreted as an indorsement of the principle of government operation in general. This year we have decided to review the question, in the light of President Hoover's veto message.

It is not easy to discuss another factor of operating expenses before any National Electric Light Association group, especially so when one is present by the invitation of the chairman of the committee in charge of that section. I mean, of course, public relations. The work of this committee is most important and can be beneficial both to the industry and the public, but the reports of the recent investigations of the Federal Trade Commission make us wonder if our rates are not including a larger amount for this item than is consistent with the public good; just how far we want to be assisted in forming our opinion; how much we want our public officials influenced by large campaign contributions, and to what extent it is wise to have one viewpoint of any question forced upon the youth of our country.

Interstate regulation puzzling

The regulation of public utilities, one of the most widely discussed of present-day problems, is to me one of the most interesting phases of the electric industry. There seems to be an endless variety of theories, as is shown by the innumerable writings and discussions on the subject, and by the various powers of the state utility commissions. Even here in our New England states there are interesting differences and each session of the Legislature sees the passage of new bills meant to safeguard the public welfare. The greatest weakness of the commission system of regulation seems to be its dependence on the personnel of the commission. We, in New Hampshire, feel that we are very fortunate in this respect, and in the powers granted to the commission. As far as state regulation is concerned, the interests of the public and the utilities are fairly well protected, but when electric power is transmitted across state lines it seems to enter a no-man's land as far as adequate regulation is concerned. Therein lies our greatest weakness today. It was all right to depend upon state regulation a few years ago, when the communities were served by small local companies, but the "superpower" systems, which have brought us so many benefits, have brought us many problems as well, and have created questions of regulation which have not, as yet, been adequately met. We have learned that the transactions of a company in one state may affect the rates in another state, but I should not like to have all the power produced in New Hampshire confined within the state. It would, of course, mean that we would not have such a development as Fifteen-Mile Falls, which is bringing much into the state in increased valuations and additional sources of revenue.

These are some of the reasons why, instead of saying, with the average housewife, that we want low rates, I think we would say that what we want most is accurate information regarding cost factors, knowing that if we were sure of these we would not have to worry much about rates. We fear and criticise the thing we do not understand. Not a day passes that does not bring an added lesson in the value of understanding and co-operation. We want the comforts and luxuries that the increased use of electric current will bring. You want the additional outlet for electrical energy that would come with such use. Surely, a little less fear of comparisons on your part, and a little less distrust of the "power monster" on ours, would work to our mutual advantage.

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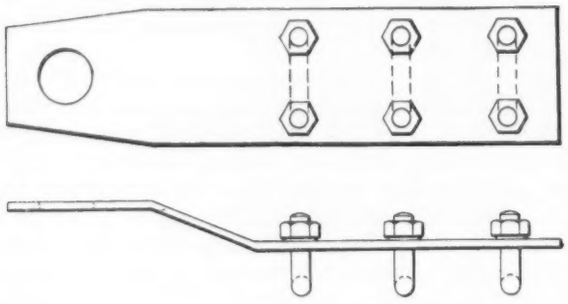
Portable Compressor Plant Expedites Pavement Opening

Block pavement is opened five times as fast as with bull points and sledges by utilizing air hammers supplied at 90 lb. per square inch from the portable compressor plant shown above on a Boston Edison underground conduit job. The contractor, F. A. Snow, mounted a standard American Express container body on a gasoline truck and equipped it with an engine-driven compressor unit capable of serving three air hammers at once. The sides were screened to provide ventilation and the truck can be locked and parked on the job in the field at night to facilitate resumption of work in the morning.

Scrap Bus Made Into Dead-End Clamps



Savings of major importance can often be effected by the utilization of scrap material. A case in point occurred, according to H. C. Snyder, Ashland, Ky., in his experience on a factory wiring job in which 21 dead-end clamps were required for holding heavy cable leads. The clamps were made on the job out of scrap pieces of copper bus, as shown in the sketch, at a labor cost of 60 cents each for drilling and shaping. Adding in the price of the 63 U-bolts required brought the cost of each clamp to about 75 cents. The manufactured clamps ordinarily used for this purpose cost $8 apiece.

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READERS' FORUM

How One Reader Reacted to "Man Power Plus"

To the Editor of the ELECTRICAL WORLD:

In the October 17 issue of the ELECTRICAL WORLD there appeared an article "Man Power Plus," in which was discussed a book recently published in English translation in this country under the title "New Russia's Primer." The writer, to use his own words, spoke of "mis-statements which abound," "ridiculous stories about us," etc. Since I had no memory of such impressions I reread the book in part, with the result that the article was classified—mentally—with a group of others which have appeared in the ELECTRICAL WORLD, several this year, and which all seem to me to defeat their purpose.

To consider this particular case, the American introduction to the book tells us, "It also purposes to explain *to children* the nature of a *planned economy* and to introduce them to the entire subject of social planning." The writer of the article seems to have overlooked this viewpoint entirely, else he might have reconciled some of the cases in which, according to him, "we observe a great difference in the benefits gained by Russians and the disadvantages which they say penalize Americans" (from the same source). Likewise, some of the so-called "ridiculous stories" may be ridiculous, but they nevertheless are *facts*—not theories, ideas or fancies. In the same mood, very many of the writer's arguments may be controverted, but that is not my purpose.

If the present-day American system is to be kept more or less intact, and if such principles as government ownership are to be opposed (this is apparently the reason for these articles), then the conservative viewpoint must be intelligently defended. The proponents of new or untried ideas can often be convincing, logical, and can show that their plans are reasonable. There is, of course, reason on the conservative side also. But what happens when, say, a man of open mind and average intelligence sets out to learn both sides of the question? As far as the conservative viewpoint is concerned, he reads numerous articles such as the one mentioned above, and if he happens to be well posted on current problems, he picks out so many flaws that his emotions, if not his reason, are alienated, or he reads phrases, such as "tear the masks from the demagogues" (quoted from the ELECTRICAL WORLD, June 13), which leave him similarly affected.

I have followed this idea quite casually, and in my very limited experience there has been only one man—George W. Anderson, president of Consolidation Coal—who has intelligently presented the conservative view so that, when placed beside the opposing view as presented by, say, Norman Thomas (I heard these two men speak at the same meeting), it appeared to be a living thing for live people rather than a monument to pure inertia, selfishness or stick-in-the-rut spirit. What the conservatives, to my mind, need is less bad propaganda and more downright intelligence in the presentation of their viewpoint; they should observe completely the spirit of the ELECTRICAL WORLD editorial "Argument vs. Declaration" (July 11) and carry that spirit beyond the wording of the editorial.

University of Pennsylvania,
Philadelphia.

J. G. BRAINERD.

Rural Business Growth Dependent on Attitude

"The utility that will carry none of the burden of pioneering (rural service), that expects a high profitable return from the word 'go' on every dollar spent in reaching this comparatively new field, and is unwilling to assume any responsibility for taking care of this part of its public obligation or for developing it, will not attract a sufficient amount of business to keep the issue alive and is not fulfilling its obligation as a public servant.

"Watch the company that insists on the guarantee of a handsome return from the outset on every fraction of a dollar invested in promoting the rural business. You will see one that we feel is not only flirting with trouble for itself but is selfishly making it hard for the whole industry to progress and to ward off criticism."

J. HOWARD MATTHEWS,
Chief Engineer Illinois Commerce Commission.

Men of the Industry

THEODORE BOETTGER has been elected a director of the Public Service Corporation of New Jersey to fill the vacancy caused by the death of Uzal H. McCarter.

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GEORGE CULLIGAN has been named as industrial engineer for the Fort Dodge Gas & Electric Company, Fort Dodge, Iowa. He will be in charge of a sales department devoted exclusively to the sale of gas and electrical devices for industrial use.

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RALPH N. ROBERTSON, until recently chief engineer of the Blaw-Knox Company, Pittsburgh, has just been appointed vice-president and a director of the Atwood-Bradshaw Corporation, also of Pittsburgh.

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PANFILO TROMBETTA has resigned from the research laboratory of the A. O. Smith Corporation of Milwaukee, Wis., to organize the Solenoid Company, which will manufacture special direct- and alternating-current solenoids and electromagnets, controllers and thermal overload protective devices.

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E. F. HOBBS, who has been connected with the Bartlesville Gas & Electric Company, Bartlesville, Okla., for the past eleven years, has been promoted to the position of superintendent to succeed the late T. F. Patterson.

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DR. CALVIN W. RICE, secretary of the American Society of Mechanical Engineers since 1906, will be made an honorary member of that association at the coming annual meeting in New York. As a fitting recognition of his service a testimonial to him will occupy an important place in the program at the annual dinner to be held at the Hotel Astor December 2. In commenting on this event the current issue of the A.S.M.E. *News* says: "Dr. Rice came to the society with a splendid record of engineering achievement, a fine showing of accomplishment in engineering society work and high ideals for the position the engineering profession should occupy. He has worked unselfishly and untiringly for the interests of the profession, the success of which is measured only in part by the growth of the A.S.M.E. in strength, influence and standing. He has devoted himself to the ideal of a united profession which should take important leadership in civic affairs, in better international understanding, in advancement of education and research and in the promotion of industry." Dr. Rice is a fellow of the American Institute of Electrical Engineers and of the Institution of Electrical Engineers (British) and a member of numerous American and foreign technical societies.

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S. A. Muldrew Assumes New Duties

SAMUEL A. MULDREW has been appointed superintendent of distribution for the United Electric Light Company, Springfield, Mass., succeeding W. H. Bolewine, who recently retired after many years of distinguished service in

this position. R. H. Habberly was appointed assistant superintendent upon Mr. Muldrew's promotion. Mr. Muldrew is a native of Springfield and was educated at Wentworth Institute, Boston. Following a short term of service with the Boston Edison company he became attached to the underground construction department of the United company in 1914 and later became assistant superintendent of distribution under Mr. Bolewine. He is a member of the underground construction committee of the National Electric Light Association.

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W. HANE, formerly in charge of the Jefferson City (Mo.) plant of the Missouri Power & Light Company, has assumed his new duties as chief engineer for the company's plant in Mexico, Mo. T. E. HOBBS, assistant superintendent at Jefferson City, has been promoted to chief engineer at that plant.

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GEORGE BUHRMAN has resigned as manager of the Clarion (Iowa) municipal light plant to join Fairbanks, Morse & Company.

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E. A. CRELLIN, who is connected with the Pacific Gas & Electric Company, has been elected a director of the Engineers' Club of San Francisco for three years.

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CARL F. MOWREY, in charge of refrigeration activities for the Syracuse Lighting Company, Inc., Syracuse, N.Y., is now located at Oswego, where he is in charge of industrial sales for the People's Gas & Electric Company. Mr. Mowrey has been identified with the Syracuse utility since 1924.

•

EVAN B. STRAUSS has been appointed director of public relations of the Jersey Central Light & Power Company. Mr. Strauss is a graduate of the University of Illinois. He served in the new-business department of the Public Service Company of Northern Illinois, and has also had banking experience.

•

D. L. MCLEAN has been appointed chairman of the Hydro-Electric Power Commission, the formation of which was authorized by the Manitoba government at the last session of the provincial Legislature. Mr. McLean is the present provincial hydro commissioner. The other members will be J. W. SANGER, chief engineer of the Winnipeg Hydro, and H. H. COTTINGHAM, chairman of the city of Winnipeg parks board.

•

D. W. PEABODY, for the past 25 years connected with the Southeastern district office of the General Electric Company in various engineering, sales and executive capacities, has established a consulting engineering office in Atlanta, Ga. Mr. Peabody will specialize in mechanical and electrical engineering—making surveys, submitting reports, developing designs and layouts, supervising construction, process and operation, and serving in a general consulting capacity. Shortly after graduation from Alabama Polytechnic Institute in September, 1902, he entered the testing department of the General Electric Company. For more than two years he worked in various departments of this company at the Schenectady, Lynn and Harrison plants, before being trans-

ferred to the Southeastern district office at Atlanta. In this office he served successively as supply salesman, assistant district engineer, district engineer, textile specialist, general apparatus sales engineer, and finally as manager of the industrial department for the Southeastern district. Mr. Peabody entered the engineering field when the industry was taking its first steps in the Southern states—before much attention had been given to the possibilities of engineering application to Southern industry. He is credited with being one of the earliest pioneers in the development of individual motor drive in the textile industry, with supervising the first electrification projects in phosphate and lumber plants, with original electrical and mechanical design in the steel, cotton-gin and oil-mill industries, and in the development of mechanical and electric building equipment.

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BRANCH H. PHILLIPS, JR., has been appointed director of public relations of the Eastern Shore Public Service Company. Mr. Phillips is a graduate of Western Maryland College.

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CARL A. PETERSON, designing engineer of the Atwood-Bradshaw Corporation, has been appointed chief engineer and a director. Mr. Peterson was formerly connected with the Blaw-Knox Company.

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FREDERICK P. GRUENBERG of Philadelphia has been appointed a member of the Public Service Commission of Pennsylvania, according to an announcement made by Governor Pinchot. Mr. Gruenberg will fill the vacancy created by the resignation several months ago of James S. Benn. Mr. Gruenberg was for years director of the Bureau of Municipal Research of Philadelphia and at one time was chairman of the Government Research Conference of the United States and Canada. He is identified with banking interests.

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C. W. MARTIN has been appointed assistant resident manager of the Amsterdam district of the New York Power & Light Corporation. Mr. Martin's duties will include both gas and electric engineering and operating problems as well as assisting in the general supervision of the district. Previous to his appointment at Amsterdam, Mr. Martin was industrial power and gas specialist at Hudson, where he had been stationed since July, 1930. Mr. Martin removed to Hudson from Albany, where he had been engaged in the general commercial department for a year. He was previously associated with the Utica Gas & Electric Company at Utica for ten years and at the time of his transfer to Albany in 1929 was in the new-business department of the Utica company. Mr. Martin, a native of Carthage, N. Y., was educated in Utica, where he spent the greater part of his early life.

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JOHN C. MACKEEN of Halifax, N. S., has been elected president of the Nova Scotia Light & Power Company, succeeding W. H. Covert, who has been appointed Lieutenant-Governor of Nova Scotia. Mr. Mackeen is one of the youngest chief executives in Canada.

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W. L. MELLON, banker of Pittsburgh, Pa., has been elected a member of the executive committee of the Westinghouse Electric & Manufacturing Company to fill the vacancy caused by the death of Harrison Nesbit. Mr. Mellon is chairman of the board of directors of the Gulf Oil Corporation and of other oil companies. In addition, he is a director of the Mellon National Bank, Union Trust Company, Union Savings Bank, Standard Steel Car Company, Ligonier Valley Railroad and various other corporations.

•

J. B. CALDERWOOD, for 22 years owner and manager of the electric light plant in Grundy Center, Iowa, has resigned as divisional manager of the Northwestern Light & Power Company, which four years ago acquired the plant from the Iowa Public Service Company. In 1925 the Iowa Public Service Company purchased the unit from Mr. Calderwood. He had gone to Grundy Center in 1909 from the Allis-Chalmers works in Milwaukee. LESTER DODD succeeds Mr. Calderwood and VERNON MOOTY has become manager of the plant.

•

RALPH LEAVENWORTH has been appointed general advertising manager of the Westinghouse Electric & Manufacturing Company in charge of all advertising and publicity activities of the company. Under his supervision will fall the advertising division of the merchandising department, now centered in Mansfield, Ohio. The business career of Mr. Leavenworth, prior to his association with the Westinghouse company, has been one in which sales and advertising administrative work have been closely paralleled. He will have his office in the East Pittsburgh headquarters of the company.

•

G. A. ELLIOTT, consulting engineer, has been elected a short-term director of the Engineers' Club of San Francisco. Mr. Elliott has been prominently identified with the electrical industry in the West for a number of years. He spent two years as field engineer for the Pacific Gas & Electric Company, 1906-1908, and the following year he served as superintendent of line construction for the Great Western Power Company of San Francisco. From 1909 to 1930 he was identified in various capacities with the Spring Valley Water Company with offices in San Francisco. It was last year that he established his own practice.

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OBITUARY

JOHN V. HARDING, SR., superintendent of the Marseilles plant of the Illinois Power & Light Corporation, died October 4. Mr. Harding had been with the company for many years.

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CHESTER M. WYMAN, manager of the municipal electric plant at Scottsburg, Ind., died October 11, of typhoid fever contracted while on a vacation trip. Mr. Wyman was 45 years of age.

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WILLIAM M. ACKERMAN, for many years a sales engineer in the motor division of the Boston office of the General Electric Company, died at Somerville, Mass., November 5.

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HOWARD A. CARSON, for many years chief engineer of the Boston Transit Commission and builder of the first rapid transit subway in this country, died at Malden, Mass., October 26 at the age of 89.

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JOHN B. LAGARDE, 63, of the industrial development department of the Alabama Power Company, died suddenly last week. Mr. Lagarde had been prominent for twenty years in Alabama's industrial development.

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ELMER W. DEVED, assistant superintendent of production at the Yale & Towne Works, Stamford, Conn., died suddenly in the company's hospital, October 27, of a heart attack. He had been with the company for almost 34 years. Mr. Deved was born in Phillipsport, N. Y.

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REV. DR. JOHN T. JUDD, treasurer of Bucknell University and president of the Citizens' Electric Company, Lewisburg, Pa., died of heart disease in that city November 4. Dr. Judd was 80 years of age. In addition to being chief executive of the Citizens' Electric Company, he was a director and officer in the Lewisburg Gas Corporation and vice-chairman of the Lewisburg Trust & Safe Deposit Company. Born in Toronto, Ont., Dr. Judd was educated at George Washington University and the Crozier Theological Seminary. Bucknell University conferred on him an honorary degree of doctor of divinity.

Financial and Statistical News

CONTRARY to precedent, utility financing is resumed, after the lull, in the form of several offers of rights to buy common stocks rather than the usual preliminary short-term bond issues. Totals so far approximate $50,000,000 offered by Electric Power & Light, Public Service of Northern Illinois and Commonwealth Edison Companies. Offerings are, of course, at prices well below the market in most cases; a substantial inducement is obviously necessary at this time to assure absorption of any large volume of new securities.

——PUBLIC UTILITY STOCKS AGAIN ROSE SHARPLY DURING THE WEEK, with the average of 37 holding and operating company stocks at 47.1, against 44.8 last week and 41.2 a month ago. Average yields, while well under levels of a month ago, are still far above averages for years generally regarded as normal.

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General Public Service Buys Its Debentures

PURCHASE OF ABOUT $500,000 of its outstanding debenture 5s of 1953 and its convertible debenture 5½s of 1936 has just been completed by the General Public Service Corporation, one of the Stone & Webster companies.

A recent offer to debenture holders stated that the corporation would purchase the debenture 5s of 1953 at 80 per cent of face value and accrued interest, and the convertible debenture 5½s at 90 per cent and accrued interest.

The right was reserved to reject debentures after $500,000 had been applied to their purchase, purchases being made according to the order in which they were received. This action, it is stated, raises net assets behind the debentures to more than the 125 per cent provided for in the indenture under which the debenture was offered.

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Nine Months Output Down 4½ per Cent

SEPTEMBER OUTPUT of public utility plants approached somewhat closer to that in 1930 than was the case in August, it appears from the report of the U. S. Geological Survey. It was 3 per cent below last year's figure, against 4 per cent in the preceding month. The average daily output was 251,900,000 kw.-hr., about 2½ per cent more than the daily production in August.

Of the total of 7,555,911,000 kw.-hr. water power contributed 2,220,468,000 kw.-hr., or 29.4 per cent. Production from this source continues to be less than in 1930 and shows the same seasonal decrease as last year. The Survey report holds out no prospect of improvement until the flow of power streams has been substantially increased by a marked increase in precipitation.

Small gains over last year's corresponding output are again revealed in New England and the South Atlantic States. Other sections are still down, compared with 1930, particularly the Mountain States, where the decrease is 19 per cent.

During the first nine months of the current year the total production was 68,736,000,000 kw.-hr., or about 4½ per cent less than in 1930. The quantities here given refer not only to central stations for light and power but to all other plants that generate electricity for public use, including electric railway operation.

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New Hampshire Stock Sale Great Success

MORE THAN 5,660 shares of the 6 per cent preferred stock of the Public Service Company of New Hampshire were sold between September 28 and October 15 during a campaign in which the quota assigned to employees was exceeded by 60 per cent. About three-fourths of the shares were sold to customers of the company. Thirty-seven employee teams competed, and of these 27 reached or exceeded their quotas. Eight teams sold in excess of 200 per cent of their quotas. The company is a subsidiary of the New England Public Service Company, which is the parent holding property of the New England Insull group.

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Capital Issues Await Market Receptiveness

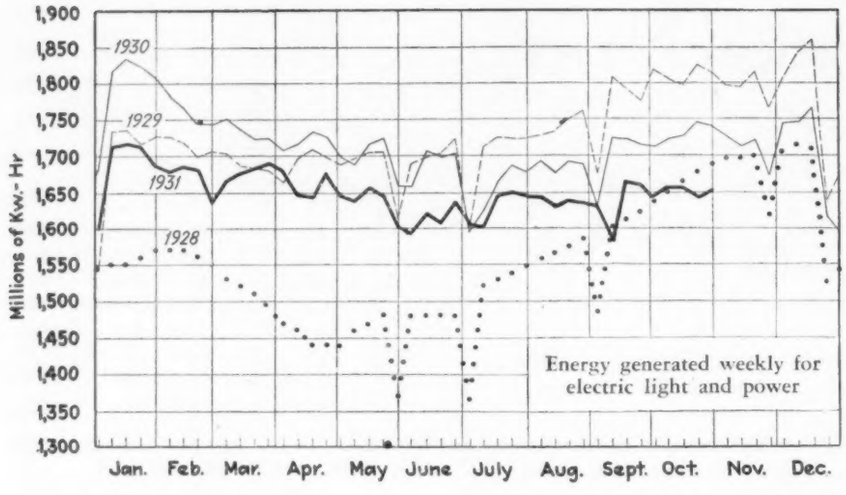
THE majority of investment bankers anticipate a prompt resumption of new capital operations if business reports continue as optimistic as they have been during the past fortnight. Financing in the utility field has been at a standstill and the same is true largely of all new financing.

This cessation in the distribution of securities points to its own cure. For a postponement of financing certainly involves the piling up of issues ready to sell when the market is deemed receptive. The depressed state of business naturally reduces the need for new capital in certain lines, but it by no means eliminates the need in many industries.

The utility industry is one of these. It will probably not be the first to come forward in a large way because certain municipal issues are overhanging and can usually be sold before the market is open to corporate issues. The impossibility of selling even these municipal issues, especially in October, is seen from a summary made by the *Commercial and Financial Chronicle*, which shows that 86 different municipalities offered bonds in October without success.

In the utility field certain large issues were disposed of with difficulty just prior to the "dead spot" period in October. At that time several small issues for funding and other purposes were ready to sell, but the market was not receptive, so they were held over until a later date. It is now believed several of these will appear in the near future.

The strength of bonds during the past few days and the occasional spurts in quotations are regarded as favorable signs that the investing public is taking a more opitmistic view of the outlook.



Last Week's Output

OUTPUT OF ELECTRIC light and power plants continues less than in the corresponding periods of the two preceding years, by an approximately constant margin from 1930. The only important exception is New England, where the production has for a number of months been greater than in 1930 and where the excess amounted to 2.3 per cent for the last week in October. During the same week the central industrial region was down 9.5 per cent from 1930, an unusually large decrease.

The following comparable weekly figures, in millions of kilowatt hours, have been announced by the National Electric Light Association:

	1931	1930	1929	1928
October 3	1,646	1,711	1,819	1,637
October 10	1,653	1,724	1,806	1,651
October 17	1,656	1,729	1,790	1,665
October 24	1,647	1,747	1,824	1,678
October 31	1,652	1,741	1,816	1,688
November 7....	1,628	1,728	1,798	1,697

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California-Oregon Company Authorized to Issue Securities

AUTHORIZATION TO ISSUE $4,000,000 of present refunding 5 per cent series, due 1961, mortgage bonds was given the California-Oregon Power Company by the California Railroad Commission to be deposited as collateral security for the payment of $3,500,000 of one-year notes. These notes are to be sold at not less than 98½ per cent of their face value and accrued interest, are to bear 4½ per cent interest and are to be sold on or before December 31, 1931. The bonds and notes may not be issued until the commission has authorized the company to execute trust agreements to secure the payment of the bonds and notes.

Authorization was also given to sell $3,000,000 of 5½ per cent gold debentures, due October 1, 1942, at not less than 97 per cent of their face value and accrued interest, such issue to be sold on or before December 31, 1931. Authorization to sell 5,000 shares of its 6 per cent preferred stock, series of 1927, at not less than $94 net per share, such stock to be sold on or before June 30, 1932.

The proceeds from the sale of the above securities, the Railroad Commission directs, are to be used to pay $3,000,000 of general and refunding mortgage bonds, to pay floating indebtedness incurred to retire underlying securities, to pay for additions and betterments and to pay the cost of constructing additions and betterments to its plants and properties from August 1, 1931, to December 31, 1931; provided that only such expenditures may be paid through the use of the aforesaid proceeds as are properly chargeable to fixed capital accounts under the uniform system of accounts prescribed by this commission or other governmental authority having jurisdiction over applicant's operations, and provided, further, that none of these proceeds may be used to pay the premium on the general and refunding mortgage bonds, nor may the unamortized debt discount and expense applicable to these bonds be added to the discount and expense on the notes and debentures above referred to.

▼

Investment Bankers Provide Reports on Foreign Bonds

ACCURATE AND COMPLETE DATA on foreign bonds held by the American public will be provided by the Institute of International Finance, according to plans set out by the Investment Bankers' Association of America in convention at White Sulphur Springs, W. Va. This policy, which has a bearing on $7,000,000,000 worth of foreign bonds held here, is designed to "save investors from sacrificing their investments in the present market at prices far below intrinsic worth." Utility securities are prominent among those concerned. The report was issued by Allan M. Pope, president-elect of the association.

Special reports will be prepared whenever a country fails to meet its obligations or when its finances are known to be in difficulty. These reports will be issued broadcast and in non-technical language.

The report says in part:

Whereas the effect of trade depression naturally takes time to be cured, the remedial measures already applied in countries in default should have a tendency to overcome those effects much more rapidly than would otherwise be the case. The overthrow of one government by another, which in some cases has taken place, as is inevitable in the midst of financial disturbances, has not affected the attitude of any country as a whole toward the necessity of eventually meeting its foreign obligations. The development of world trade of itself necessitates the maintenance of international credit upon all countries engaged in international trade, and for this reason alone repudiation of external obligations is not to be thought of by an exporting country. The necessity for re-establishing credit by meeting past due obligations in the shortest possible time is to a greater extent than ever of the utmost importance to every nation now in default.

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Canadian Output in September

ELECTRIC OUTPUT IN Canada continues to be somewhat less than it was in 1930, and the rate of decrease compared with that year continues to exceed that experienced in the United States. The production during September, reported by the Dominion Bureau of Statistics as 1,288,113,000 kw.-hr., was nearly 11 per cent less than in September of last year and about 13 per cent smaller than in 1929.

The seasonal influence is revealed in the increase over the summer months; the output in July was 1,251,330,000 kw.-hr., in August 1,256,149,000 kw.-hr. In September about 95 per cent of the energy came, as usual, from water power; fuel produced only 24,701,000 kw.-hr.

Comparative September figures for 1930 and 1931 are given in the table. They show gains in the Maritime and Prairie Provinces, but reductions in the two predominant power-consuming provinces, Quebec and Ontario, notably the latter.

Generated by Water Power
(Thousands of Kw.-Hr.)

	1931	1930	Per Cent Change
Maritime Provinces.	46,251	38,662	+ 19.5
Quebec	662,400	704,123	— 5.8
Ontario	355,122	485,151	— 26.7
Prairie Provinces...	102,835	92,060	+ 11.8
British Columbia...	96,804	99,055	— 2.2
Generated by Fuel			
Prairie Provinces...	13,136	14,882	— 11.7
Other Provinces ...	11,565	9,028	+ 28.1
Total exports ...	93,288	153,657	— 39.3

Industrial Tides Mixed

IN MANY respects industrial activity in October was at virtually the same level as in September, though in the "All Industry" average the favorable features are masked by the effect of declines—to some extent normal at this season—in important branches. Consequently that general average is down 3 per cent from the preceding month and 6 per cent from October, 1930.

Nevertheless, several industries that declined from September to October last year either maintained their level this year or had a smaller decrease. This applies particularly to "consumer goods." The fact is that people are eating, wearing out clothing, burning up gasoline and using up tires, reading and then, in the metropolitan districts at least, littering streets and cars with tons of discarded newspapers.

These everyday observations are supported by the conclusions to be drawn from index numbers of industrial activity based on electrical energy consumption as reported monthly to the ELECTRICAL WORLD.

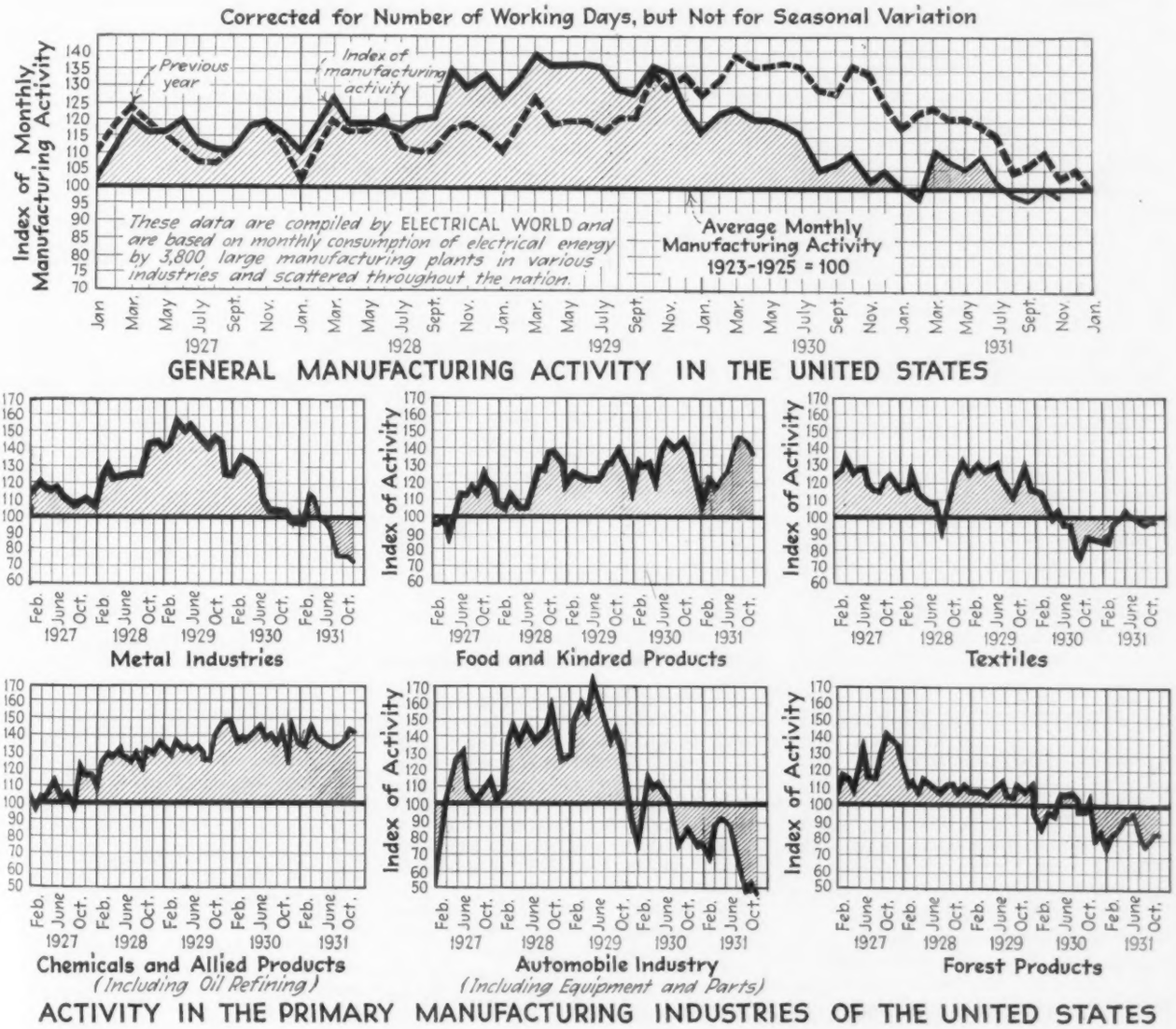
For example, the textile industry continues about as in the past half year, 30 per cent above its 1930 minimum and 15 per cent higher than in October of that year. Food products, though as usual slightly down from summer activity, are on a par with 1930, a record-breaking year. Leather held the gains of the preceding month, remains well above August operations, missing 1930 figures by less than 4 per cent. Chemicals and stone, clay and glass products were other groups exceeding last year's activities.

The rise in automobiles at this season of the year is unusual. The incomplete returns on which the accompanying chart had to be based had shown a decrease. Later data reversed this. The metals group, however, moved downward to the lowest point in recent years.

Index of Manufacturing Activity

Base: Average Month, 1923-25

Industrial Groups	October, 1931	Sept., 1931	August, 1931	July, 1931	October, 1930
All Industry	**97.1**	**100.4**	**97.3**	**97.9**	**103.2**
Automobiles (including parts and accessories)	57.4	53.7	43.6	55.9	80.9
Chemical products (including oil refining)	142.0	144.6	137.6	137.7	122.4
Food products	136.5	142.0	146.4	147.0	137.2
Iron and steel	76.3	78.3	78.0	83.1	126.0
Metal working	71.0	75.0	73.3	69.3	87.0
Leather products	81.8	81.9	77.1	83.8	84.9
Forest products	82.2	82.2	79.4	76.9	77.1
Paper and pulp	113.0	138.3	121.7	104.0	120.0
Rubber products	82.8	88.0	98.5	97.4	99.0
Shipbuilding	84.5	88.9	85.6	82.0	121.5
Stone, clay and glass	113.4	113.9	105.9	104.8	106.3
Textiles	98.2	98.7	95.0	98.2	85.4


Corrected for Number of Working Days, but Not for Seasonal Variation
Index of Monthly Manufacturing Activity
Previous year
Index of manufacturing activity
These data are compiled by ELECTRICAL WORLD and are based on monthly consumption of electrical energy by 3,800 large manufacturing plants in various industries and scattered throughout the nation.
Average Monthly Manufacturing Activity 1923-1925 = 100
GENERAL MANUFACTURING ACTIVITY IN THE UNITED STATES
Index of Activity
Metal Industries
Food and Kindred Products
Textiles
Chemicals and Allied Products
(Including Oil Refining)
Automobile Industry
(Including Equipment and Parts)
Forest Products
ACTIVITY IN THE PRIMARY MANUFACTURING INDUSTRIES OF THE UNITED STATES

Business News and Markets

Allis-Chalmers Orders 15 per Cent Higher

UNFILLED ORDERS RECEIVED by Allis-Chalmers Manufacturing Company at the end of October were $9,101,000, against $7,915,000 a month previous, a gain of about 15 per cent. This is stated to be a much better showing than was anticipated in view of the general state of business.

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Business Is Better in the Southwest

THE SOUTHWEST WILL go into the winter of 1931-1932 in much better shape and "with a far better mental attitude" than that of a year ago, according to James C. Kennedy, president of the Central & Southwest Utilities Company. Mr. Kennedy based his statement on a monthly report of business conditions in his company's territory, recently compiled.

"According to this report," Mr. Kennedy said, "farmers in the Southwest are getting some money for cotton and grain in spite of low prices. Since they made these crops very cheaply, this is not as bad as low prices would have been a year ago, or two years ago. They have raised great quantities of food which they have canned for home consumption, and this will see them through the winter in good shape."

Mr. Kennedy also pointed out that the unemployment situation in the Southwest is much better today than a year ago. There is a growing appreciation among people, he said, that charity misdirected is a bad thing and there will not be the hysterical relief plans made this winter that went into effect last fall.

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General Electric Helps Electrify Spanish Rails

GENERAL ELECTRIC COMPANY and its German and French affiliates, Allgemeine Elektricitäts-Gesellschaft and Alsthom respectively, have formed a Spanish subsidiary to co-operate in the electrification of Spanish railroads. The new unit, called Geathom, will be capitalized at approximately $2,000,000.

The basis of the new organization will be two small existing Spanish corporations controlled by the German General Electric Company. It is announced that if foreign products are to be imported, the German and French proportions will be three and two respectively.

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Westinghouse Orders Down 22.5 per Cent

ORDERS RECEIVED BY Westinghouse Electric & Manufacturing Company in the first nine months of this year amounted to $105,821,203, a decrease of 22.5 per cent, compared with the $136,529,018 booked in the corresponding period of 1930. Against 1929, when orders totaled $185,625,135, the current year's business shows a decrease of 43 per cent.

A letter written to stockholders states that "due to the greater efficiency in the operation of the company it has made a small profit during recent months even though the amount of business was much less than in previous years. Every salary was substantially reduced last spring and general curtailments made in all lines of expenses. Notwithstanding the reduced pay of employees the efficiency of the company and its ability to produce work have not been hurt but, if anything, have been improved."

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Maytag Company Profits Decline Sharply

OPERATIONS OF Maytag Company for the nine months ended September 30 show net profit, after depreciation and other deductions, of $212,402, compared with $1,839,626 for the same period last year. For the quarter ended September 30 the company showed a net loss of $258,591, against a net profit of $255,240 in the preceding quarter and $456,699 for the third quarter of 1930.

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Interim Revisions in Electrical Code

HOW interim revisions should be made in the National Electrical Code in case such revisions are desired is thus summarized by A. R. Small, chairman of the electrical committee of the National Fire Prevention Association:

(a) The chairman of the electrical committee may submit to letter ballot of its membership any suggested revisions of the National Electrical Code which, in his opinion, are desirable and non-controversial.

(b) The chairman of the electrical committee shall, upon request in writing of not less than five of its members, submit to letter ballot of its membership any suggested revisions of the National Electrical Code.

(c) Where, in the opinion of the chairman of the electrical committee, it is not clearly evident that a proposal is desirable and non-controversial he may first submit the proposal to the appropriate article committee or committees and shall, on the basis of a two-thirds favorable vote of the article committee membership, submit the proposal to the electrical committee for letter ballot.

(d) Proposals submitted in accordance with any one of the three foregoing methods which receive favorable votes by letter ballot from at least two-thirds of the electrical committee membership shall be declared recognized interim revisions of the National Electrical Code and shall be so announced to the electrical committee membership and to the public through the electrical trade press.

(e) Every such recognized interim revision of the National Electrical Code shall, unless otherwise amended, be submitted to the National Fire Protection Association and to the American Standards Association for approval following the next regular meeting of the electrical committee.

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De Forest Radio Not to Quit Tube Business

ACCORDING TO AN ANNOUNCEMENT made by William J. Barkley, vice-president, the De Forest Radio Company has no intention of discontinuing the receiving tube business. The company has merely refused to solicit business entailing a loss, Mr. Barkley states, but the plant at Passaic, N. J., is operating steadily, turning out receiving tubes.

De Forest Radio also produces transmitting tubes of all types as well as complete transmitters, special amplifiers and other equipment to meet the demands of radio communication and program distribution.

Study Distribution of Electrical Goods

GREATER CARE IN CREDIT EXTENSION as a means of controlling bad-debt losses is a problem of primary importance to profitable wholesaling of electrical goods, according to the United States Commerce Department's report of its newest cost-and-operations analysis, "Problems of Wholesale Electrical Goods Distribution," made public recently.

Bad-debt losses were found to be wholly responsible for the marked increase in operating costs—from 16.8 per cent to 28.1 per cent of sales—shown by the business over the three-year period covered by the department's survey. Omitting these losses, it is further revealed, other operating expenses show a slight down-trend in the same length of time.

The study of electrical goods wholesaling was made by the Commerce Department at the request of the National Electrical Wholesalers' Association. It covered the operations of a single large establishment handling a wide range of electrical goods, including construction equipment, industrial goods, radio and accessories, and miscellaneous appliances, and dealing in a trade territory extending into three states.

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TRADE BRIEFS

The American Standards Association has approved a group of six safety codes, five of them for the prevention of dust explosion in industry. One of the codes provides for the use of inert gas for fire and explosion prevention.

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Clark Controller Company has omitted the dividend on the common stock.

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The Riley Stoker Corporation has issued the Riley-Badenhausen boiler catalog, an amply illustrated booklet dealing with high-capacity, high-efficiency steam generating units.

H. L. Erlicker has been appointed purchasing agent for the General Electric Company.

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International - Stacey Corporation, Columbus, Ohio, has purchased the Stacey Manufacturing Company of Cincinnati.

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E. L. Bradbury, for many years general sales manager with the Holophane Company, Inc., New York, and previously with the General Electric Company, has been appointed sales manager of Gillinder Brothers, Inc., Port Jervis, N. Y.

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New York Metal Prices

	Nov. 4, 1931 Cents per Pound	Nov. 11, 1931 Cents per Pound
Copper, electrolytic	7	7
Lead, Am. S. & R. price	3.85	4.05
Antimony	6.50	6.75
Nickel, ingot	35	35
Zinc, spots	3.50	3.60
Tin, Straits	22.25	22.13
Aluminum, 99 per cent	23.30	23.30

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EXPORTS OF ELECTRICAL EQUIPMENT (PRELIMINARY)

Article	September 1930	September 1931
Generators:		
Direct current—		
Under 500 kw	$48,609	$19,428
500 kw. and over	49,113	.....
Alternating current—		
Under 2,000 kva	22,959	6,946
2,000 kva. and over	64,051	.....
Steam turbine generator sets	53,558	43,946
Accessories and parts for generators	53,022	162,347
Arc welding sets	17,130	80,617
Self-contained lighting outfits	72,298	43,031
Batteries:		
6-volt storage batteries	184,208	125,888
Other storage batteries	114,897	40,366
No. 6 dry-cell batteries	28,179	28,203
Flashlight batteries	303,436	303,977
Radio B and C batteries (dry)	37,773	21,842
Other dry and wet cell primary batteries	18,844	3,919
Transforming and converting apparatus:		
Power transformers, 500 kva. and over	42,067	.....
Distribution transformers, less than 500 kva.	94,392	36,445
Instrument transformers	21,950	3,999
Other transformers	43,305	62,308
Complete battery chargers under 15 amp	9,034	2,433
Double-current and motor generators, dynamotors, synchronous, and other converters	57,937	106,810
Transmission or distribution apparatus:		
Switchboard panels, except telephone	372,476	20,198
Power switches and circuit breakers over 10 amp	157,259	54,186
Fuses	32,849	13,071
Watt-hour and other measuring instruments	59,188	32,678
Electrical indicating instruments	56,971	40,579
Electrical recording instruments	28,793	42,672
Other electrical testing apparatus	64,667	50,922
Lightning arresters, choke coils, reactors, and parts	70,045	41,762
Motors, starters, and controllers:		
Motors, ¼ hp. and under	174,928	98,025
Motors, over ¼ and under 1 hp	46,639	28,385
Stationary motors—		
1 to 200 hp	$232,202	$125,327
Over 200 hp	28,966	13,195
Railway motors	14,250	.....
Electric locomotives—		
Railway	108,638	.....
Mining and industrial	20,536	19,518
Station and warehouse electric motor trucks	11,261	9,338
Starting and controlling equipment—		
For industrial motors	115,787	79,916
For electric railway and vehicle motors	24,743	15,016
Portable electric tools	90,184	49,168
Accessories and parts for motors	179,514	87,069
Electric refrigerators and parts:		
Household	357,640	522,794
Commercial up to 1 ton	94,316	77,491
Parts for electric refrigerators	.....	201,812
Electric appliances:		
Electric fans	22,422	35,879
Electromechanical health exercisers	7,339	793
Electric incandescent light bulbs—		
For automobiles, flashlights, and Christmas trees	15,064	23,200
Other metal filament bulbs	78,722	43,572
Other electric lamp bulbs	11,054	4,016
Flashlight cases	86,753	52,958
Searchlights and floodlights	21,851	15,574
Electric household washing machines	122,515	33,038
Electric domestic vacuum cleaners	150,746	81,293
Other domestic motor-driven devices, except tools	43,713	47,459
Electric flatirons	24,745	17,004
Electric cooking ranges	25,539	11,877
Other domestic heating and cooking devices	80,176	44,931
Industrial electric furnaces, ovens, and other heating devices	32,607	83,648
Therapeutic and X-ray apparatus	136,207	63,354
Signal and communication devices:		
Radio apparatus—		
Transmitting sets, tubes and parts	142,073	55,758
Receiving sets	1,024,893	1,470,910
Radio receiving tubes	$167,982	$145,631
Receiving-set components	413,842	513,237
Loudspeakers	164,868	117,640
Other receiving-set accessories	144,806	33,293
Telegraph apparatus	37,935	12,549
Telephone apparatus—		
Telephone instruments	32,940	15,090
Telephone switchboards	25,616	767
Other telephone equipment	270,236	244,821
Bells, buzzers, annunciators, and alarms	24,953	14,342
Other electric apparatus:		
Spark plugs	111,346	82,689
Other starting, lighting and ignition equipment	66,164	47,901
Insulating material	62,836	80,798
Metal conduit, outlet, and switch boxes	64,035	32,818
Sockets, outlets, fuse blocks, and lighting switches	135,285	97,766
Electric interior lighting fixtures	256,467	96,262
Electric street lighting fixtures	40,376	16,654
Other wiring supplies and line material	117,927	59,171
Other electrical apparatus, n.e.s.	875,785	312,603
Rubber and friction tape	34,498	15,585
Globes and shades for lighting fixtures	46,917	35,573
Glass electric insulators	9,724	1,863
Electrical porcelain:		
For less than 6,600 volts	71,767	14,396
For 6,600 volts and over	65,643	21,551
Carbons and electrodes:		
Electrodes for electric furnaces	180,655	106,307
Other carbon products	68,871	43,141
Insulated iron or steel wire and cable	13,968	2,635
Copper, bare wire	229,440	22,796
Insulated copper wire and cable:		
Rubber-covered wire	70,525	24,405
Weatherproof wire	21,283	19,880
Telephone cable	7,321	24,175
Other insulated copper wire	183,948	107,538
Nickel-chrome electric resistance wire	.....	45,809
Totals	$9,722,992	$7,210,877
Nine months ended Sept. 30	$100,359,746	$72,071,438

Market Conditions

ELECTRICAL contracting business is quiet on the Pacific with few new jobs in immediate prospect. Retail business, however, is definitely better and appliance sales, both by utilities and by dealers, are keeping up unusually well. Ranges and radio are especially active. The Eastern market is decidedly promising.

——MOTOR AND SMALL EQUIPMENT SALES ARE WELL SUSTAINED in the New England area, with heating furnaces a feature.

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PACIFIC COAST

—CONTRACTING BUSINESS *is quiet with few new jobs in immediate sight; industrial buying has perceptibly improved, power machinery business is better and the general business tone is less pessimistic.*

—EXPECTATIONS OF *a very fair holiday business are reflected in appliance and radio purchases by dealers, particularly in labor-saving, heavy-duty devices and in low-priced household appliances as leaders. Washer and ironer sales are especially good and are expected to show a better holiday movement than normally.*

Pacific Gas & Electric is staging a low-priced range co-operative campaign at $165 installed for the four-burner, 16-in. oven style, with potential sales of 500 to 1,000 by January. Recent orders and awards include a $7,000 hotel sign for Oakland, an $8,350 Oakland street-light award, a $29,000 Los Angeles award for street lighting, a police broadcasting outfit for Fresno and three General Electric transformers for the Sierra power district.

Major power projects soon to be placed include a $220,000 expenditure for transformers and equipment and increased distribution and line material for the Lodi district. A 110,000-volt pole line of approximately 200 miles to serve the contemplated Los Angeles aqueduct, for which a $220,000,000 bond issue was recently passed by a five to one vote, will soon be figured, requiring 55- to 65-ft. poles on a 140-mile temporary line and a steel tower system on the balance.

Public buildings, divided between city or country structures, such as a group in Santa Barbara, a record hall in Martinez, a city hall in Santa Monica and privately owned structures, such as Catholic institutions in San Francisco and Sacramento, comprise the bulk of new construction, which is all at a medium value level, with no outstanding features.

New business taken by 224 identical lumber mills reporting to the West Coast Lumbermen's Association, last week, showed an increase of 21 per cent or approximately 16,000,000 b.ft. over the total of the previous week, making the largest percentage increase from one week to another during recent months and reversing the general weekly movement downward. A slight increase in buying from lumbering sources was noted, although sales of motors and miscellaneous electrical equipment remain very light. Nepage McKenny Company, holder of the electrical wiring contract and fixtures for the $2,275,000 federal building in Seattle, has taken bids for materials, including rubber-covered wire, three carloads of conduit, fiber underduct, fire alarm system, etc., and will make awards shortly. The job approximates a $60,000 expenditure. Board of Contracts and Awards, Tacoma, on November 16 will open bids for 35,000 lb. of No. 0000 A.W.G. weatherproof insulated copper wire and the Board of Public Works, Seattle, on November 20 will open bids for electrical generating equipment for the fireboat *Alki*, involving two 100-kw. generators, switchboard, etc., costing about $3,000, and has opened bids for 15,000 15-amp. 125-volt plug fuses and for 10,000 standard unpainted wood pins.

Sales reported last week included 25 transformers from 50 hp. down to local central stations and 30 motors from 75 hp. down to miscellaneous industrials; ten motors from 20 hp. down to woodworking plants, 40 motors from 150 hp. down, the majority tens and fifteens, to mines and mills, and 35 transformers from 25 kva. down to Oregon central stations; 25 motors from 100 hp. down to miscellaneous industrials and 300 meters, 25 amp., to central stations and sixteen machines, the largest 75 hp., to a mine, and the remainder to dealers.

CONSTRUCTION PROJECTS

Vallejo Electric Light & Power Company, Vallejo, Calif., has authorized power substation to cost $100,000 and will take bids at once. Pacific Hard Rubber Company, Los Angeles, Calif., operated by Stauffer Chemical Company, plans plant to cost $85,000. Los Angeles City School District, Los Angeles, Calif., is having plans drawn for high school to cost $200,000. Washington Water Power Company, Spokane, Wash., plans automatic power substation at Lewiston, Idaho. E. I. Whiting and Dodd L. Greer, St. Johns, Ariz., applied for permission to construct and operate power plant for local commercial service.

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NEW ENGLAND

—AN INCREASE IN INQUIRIES *and indications of steadiness in orders for power equipment are noted in this district. Sales of motors are holding up well and switch and control equipment sales are steady as compared with the past few weeks.*

—OF OUTSTANDING NOTE *is the marked upward trend in demand for heating furnaces and inquiries are on hand for special type furnaces and melting pots.*

According to one prominent manufacturer sales for the current year will compare favorably with last year. Heavy machinery is quiet, but one prominent manufacturer reports interest in future plant extension planned on a large scale. Central-station supplies are quiet and orders are limited to small lots. One manufacturer of outside illuminated signs reports interest and is considering a number of large projects. New construction supplies are in less demand, though special lighting units are selling well due to the incorporation in specifications for institutional types of building in this district.

CONSTRUCTION PROJECTS

B. F. Sturtevant Company, Boston, Mass., contemplates branch ventilating equipment plant at Berkeley, Calif., to cost over $300,000. Connecticut Light & Power Company, Hartford, Conn., plans equipment storage and distributing plant at Meriden, Conn., to cost about $75,000. School Board, Bridgeport, Conn., plans manual training shops in new high school, estimated cost $250,000.

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SOUTHEAST

—REPORTING CONCERNS *in the Southeast seem to feel that the worst is over and that from now on there will be a steady improvement in conditions, though opinions differ as to the rate of recovery. The general volume of electrical business is reasonably satisfactory.*

One of the largest power companies in this section has recently placed orders for lead-covered cable amounting to approximately $9,000 and voltage regulators totaling $6,800 and is in the market for regulators, subway transformers, network protectors and junc-

tion boxes; the latter equipment will be ordered this week and it is estimated will cost in the neighborhood of $35,000. A Tennessee company ordered $3,000 worth of street-lighting equipment and a Louisiana company $2,000 worth of meters. A Georgia company ordered $1,800 worth of insulators and an Alabama company ordered similar material amounting to $1,500. A South Carolina textile has placed an order for $10,000 worth of motors and control equipment. A Louisiana town ordered a 200-hp. pump motor and control.

CONSTRUCTION PROJECTS

Bureau of Yards and Docks, Navy Department, Washington, D. C., will receive bids (no closing date stated) for two automatic electric refrigerating machines for navy yard at Charleston, S. C. (Specification 6715). Tuskegee Normal and Industrial Institute, Tuskegee, Ala., approved plans for Thomas A. Edison science building to cost about $275,000.

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MIDDLE WEST

—VERY LITTLE CHANGE *in general business is observed this week in this section. The volume of business remains fairly constant, with no marked improvement indicated.*

—THE UNDERLYING TREND *is becoming stronger, and while no definite improvement is looked for this year general busines is expected to continue at its present level throughout the balance of this quarter.*

The Hoover financial plan is just beginning to get started and its effect on general business is yet largely a matter of conjecture. Although the unfilled orders for steel have fallen off, the loss is generally considered negligible. Carloadings remain practically the same this week, although a slight drop in the number of revenue cars handled is noted. It is believed that less seasonal decline will be observed as compared with last year. The various utility companies are continuing with as much of their construction work as possible and there has been a little better demand for distribution materials.

CONSTRUCTION PROJECTS

Signal Corps Procurement District, United States Army, Chicago, Ill., will receive bids until November 17 for 1,600 induction coils, 1,600 black bakelite panels, etc. (Circular 35). Ford Motor Company, Dearborn, Mich., will proceed with hydroelectric power plant and manufacturing plant at Ypsilanti, Mich., to cost over $500,000, and will carry out expansion and improvements at plant at River Rouge, Mich., to cost $400,000. Berst-Forster-Dixfield Company, Cloquet, Minn., plans wood products manufacturing plant to cost over $100,000.

EASTERN

—THE ADVANCING TONE *in industrial operations in different parts of the country is reflected in improved market activities, and the Eastern district seems on the way to some sizable account.*

—WITH CENTRAL STATIONS *buying only for immediate needs, attention is being directed to some of the basic lines of industry, notably iron and steel, and allied metal-working fields, which seem to present excellent promise for commitments for large and small capacity motors, control apparatus, cable and miscellaneous apparatus.*

—RAILROAD BUSINESS *is evidencing renewed activity and some worthwhile orders are anticipated in that quarter. With the holiday season at hand, there is growing betterment in the demand for appliances and domestic equipment from jobbing and wholesale interests.*

A New York manufacturer has closed with a central station in the Long Island district for transformers and network protectors to an amount of $35,000. An order for similar equipment has been secured by the same maker from a metropolitan power company, totaling $55,000. Allis-Chalmers Company is furnishing a quantity of transformers for the Pennsylvania Railroad Company, approximating $600,000, delivery to be carried out over a period of months. Fairbanks, Morse & Company have secured an order for a generator for a city in Iowa, at $71,000.

A manufacturer of electric washing machines in northern New York has contracted with a state manufacturer for a quantity of fractional-horsepower motors, totaling $50,000. Packard Electric Company has closed an agreement with Buick Motor Company for its cable requirements for six months, dating from January 1, 1932, and has also secured a similar award from another motor car manufacturer, H. H. Franklin Manufacturing Company; the Packard company has received another sizable award for cable from Delco-Remy Corporation, manufacturer of electric lighting and starting equipment for automobile service. Further commitments for cable and other electrical apparatus are looked for from the automobile industry.

Board of Transportation, New York, has placed a contract, recently referred to in these columns, for electro-pneumatic control apparatus with Westinghouse Electric & Manufacturing Company, at a price of $1,230,000, to be used for the 500 new subway cars purchased last month. The New York subway lines show further promise of large equipment orders, with the announcement by John H. Delaney, chairman of the board, that the transit needs will require an expenditure of about $1,000,000,000 in addition to the fund of $700,000,000 now being expended.

CONSTRUCTION PROJECTS

Signal Supply Officer, Signal Corps, United States Army, Army Base, Brooklyn, N. Y., will receive bids until November 24 for 53,086 ft. of cable and eighteen reels (Circular 43). Spring Perch Company, Stratford, Conn., filed plans for a two-unit automobile spring manufacturing plant at Lackawanna, Buffalo, N. Y., to cost $125,000. Westchester County Park Commission, Bronxville, N. Y., will receive bids until November 17 for electric lighting system for Croton Lake Bridge, Yorktown. Bellevue, Pa., plans manual training department in senior and junior high school to cost about $275,000. Bureau of Supplies and Accounts, Navy Department, Washington, D. C., will receive bids until November 24 for one electrical test bench for testing generators, etc., for Minneapolis, Minn., depot (Schedule 6865). General Purchasing Officer, Panama Canal, Washington, D. C., will receive bids until December 10 for plate steel penstocks and outlet pipes for Madden power plant, Canal Zone (Schedule 2698).

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SOUTHWEST

—RUN-OF-MINE ORDERS *are temporarily, at least, moving more freely in the Southwestern territory. Utilities and railroads are very low on staple stocks and industrial business has shown some improvement. The demand for small distribution transformers is fair, also for insulators and similar items.*

There are no really big orders passing through, but there has been better than the average business for some time in the way of medium and small size purchases. A Texas town has ordered about $6,000 worth of pump drives, including mechanical drives for steam turbines and motors from 2 to 1,000 hp. An order has also been placed here for a number of heating units for electric furnaces for use in an Eastern glass factory. That order approximated $6,500. A number of nice-sized prospective contracts are now in the conversational stage and may be signed up in the next few weeks.

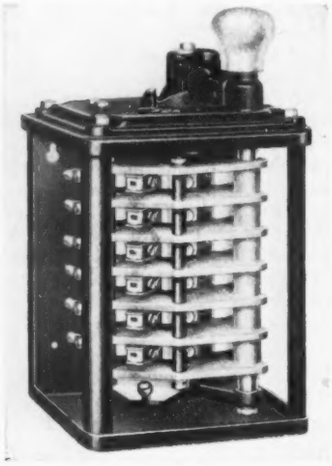
CONSTRUCTION PROJECTS

Kansas City Power & Light Company, Kansas City, Mo., plans power substation to cost about $80,000. Loose-Wiles Biscuit Company, Kansas City, Mo., is having plans completed for plant at Los Angeles, Calif., to cost over $1,000,000. Texas Public Service Company, San Angelo, Tex., plans plant for removal of sulphur from natural gas, to cost $100,000. Jefferson Lake Oil Company, Abbeville, La., will proceed with sulphur production plant to cost over $350,000.

New Equipment Available

Drum Reverse Switch

A LINE OF DRUM reverse switches designated bulletin 350, for across-the-line reversing of alternating- and direct-current motors and for reversing service in connection with magnetic starters, has been announced by the Allen-Bradley Company, Milwaukee, Wis. For the direct handling of motor cur-



rents, these switches have a maximum alternating-current rating of 5 hp., 110 volts; 10 hp., 220 volts, and 15 hp., 440-550 volts, and will handle direct-current motors up to 3 hp., 115 volts, and 5 hp., 230 volts. For reversing service in connection with automatic starters, these direct-current ratings are increased. The switches are made in two sizes.

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Vacuum Contact Mounting

TO FACILITATE THE APPLICATION of the Burgess vacuum contact to relays and other actuating mechanisms a conveniently mounted unit has been developed by the Burgess Battery Company, New York City.

The mounting is especially applicable to the standard type telephone relay. It may also be applied to any mechanical, manual or thermostatic form of actuation. An actuating force of 6 to 10 oz., with a movement of but 0.02 in., is sufficient to operate the vacuum contact, which in turn controls up to 6 amp. continuously or 8 amp. intermittently, at potentials up to 220 volts.

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A COMPLETE LINE OF NEWLY DESIGNED WELDING FITTINGS is announced by Midwest Piping & Supply Company, Inc., St. Louis, Mo. The line includes welding ells 90 deg. and 45 deg., a welding head, sleeves and saddle. The fittings are made to exact radius and sectional diameter, the result of a special compression sizing operation. The welding head has many advantages over the welded-in plate and the orange-peel; it is also superior to the standard flanged and dished head. The ellipsoidal form of the head reduces the unit stress in the metal to a minimum. But what is perhaps even more important, the circumferential weld to the pipe is entirely in tension as a result of the long tangent of the welding head. This weld is not subjected to shear and bending.

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110-Volt to 7,500-Volt Street-Light Controllers

A LINE OF NOVALUX CONTROLLERS for street lighting has been announced by the General Electric Company. Designated type CR-7841, they supersede the previous CR-7840 models. Outstanding among the changes in the new controller is that there is one switch instead of two for all voltages from 110 to 7,500.

The controllers are available in twelve designs, for either pole or subway use, for normally open, normally closed or latched-in operation and with either series or shunt coils for all commercial voltages and frequencies. The normally closed controllers were not furnished with the previous designs. Ratings are 110/220 volts, 100 amp.; 2,300 volts, 50 amp.; 4,400 volts, 35 amp.; 6,600 volts, 25 amp., and 7,500 volts, 15 amp., alternating current.

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A COMPACT AND RUGGED MANUAL STARTER, known as class 2510 W5, has been announced by the Square D Company, Milwaukee, Wis. This three-pole starter is designed to control across-the-line single and polyphase motors of 2 hp. or less. Although adapted to fan, blower, pump, air compressor, machine tool and loom installations, it is suitable for general applications where remote control and low-voltage protection are not essential.

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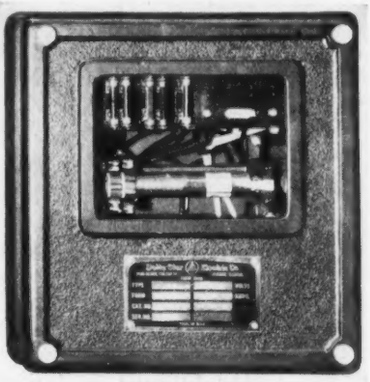
A SPECIAL NON-CORRODING AND NON-RUSTING CENTRIFUGAL DRAINAGE PUMP for transformer vaults and cable manholes has been announced by the Chicago Pump Company, Chicago. A feature of the new design is the diving bell or hood which covers and protects the motor and control equipment from high water, splashing or seepage water.

Timer Designed for Circuit Breaker Recloser

A TIMER FOR USE in connection with oil circuit breaker automatic reclosers has been announced by the Delta-Star Electric Company, Chicago. The essential elements are a patented arrangement of a small transformer, two "Raytheon" vacuum tubes, a condenser, a set of limiting resistors, relay contacts and a solenoid ratchet-operated cam switch.

The time element is determined by



the rate of condenser charge, governed by resistance steps. By introducing different resistances, reclosures up to twelve at any desired time intervals can be secured, and with final lockout.

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Meter Connection Block

A NEW METER CONNECTION BLOCK, known as the Code type, whereby the shifting of one nut disconnects the meter and connects the line and load side of the test block without breaking the circuit, has been announced by the Code Electric Products Corporation, Philadelphia, Pa. The advantage of this is that no jumpers are necessary in connecting the line and load together. The size of this connection box is 10 in. high, 8 in. wide, 3½ in. deep and has the convertible meter end plate to permit changes of different size meters. It is also made in the indoor type.

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SEVERAL CHANGES IN ITS STRIP CHART RECORDING INSTRUMENTS, type CD, have been announced by the General Electric Company. The chart reroll unit is now separate and spring-driven, releasing the clock of all duty except keeping time. Only two turns of a thumbscrew are required for fastening or removing the cover of the instrument. The type CD recording instruments are available for d.c. or a.c. operation and for portable or either front- or back-connected switchboard mounting. The switchboard instruments can be mounted on 5½-in. centers.